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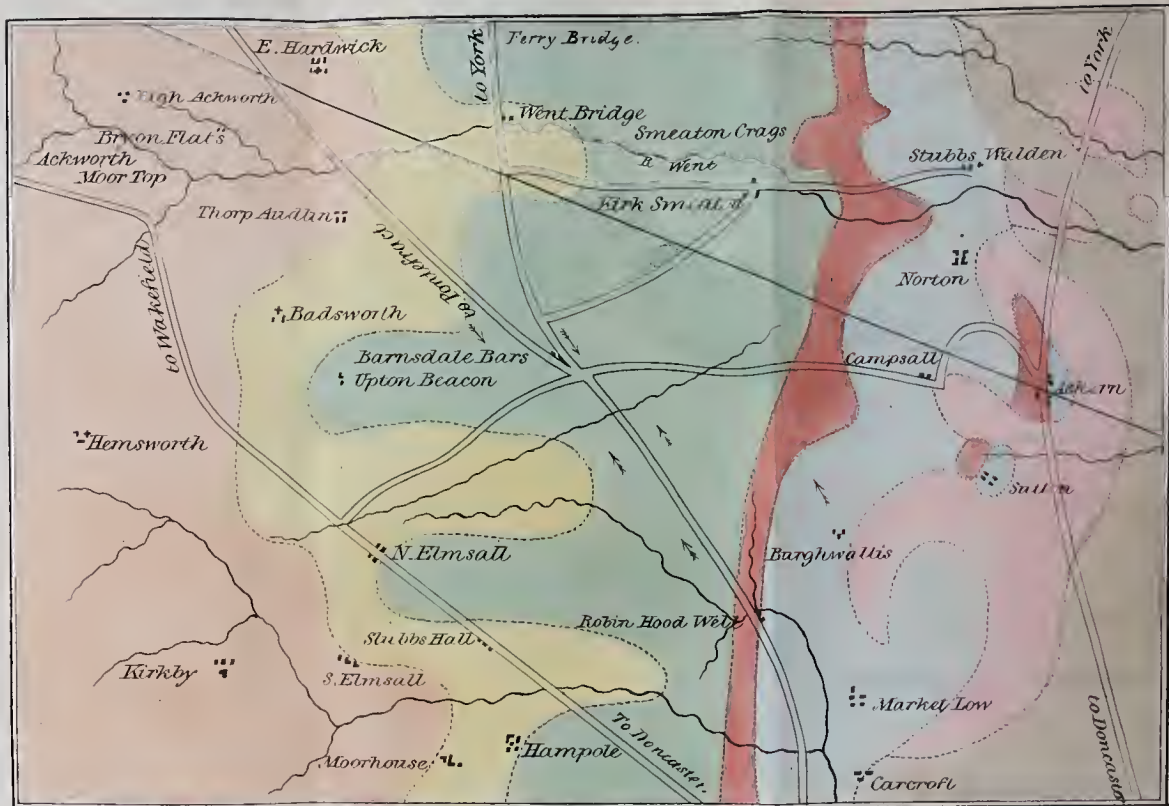
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**SECTION.**



**MAGNESIAN LIMESTONE FORMATION IN THE VICINITY OF ASKERN.**

AN ACCOUNT  
OF  
A S K E R N  
AND ITS  
MINERAL SPRINGS;  
TOGETHER WITH A  
SKETCH OF THE NATURAL HISTORY,  
AND A  
BRIEF TOPOGRAPHY,  
OF THE IMMEDIATE NEIGHBOURHOOD.  
BY  
EDWIN LANKESTER, M.D. ; F.L.S. ;

MEMBER OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON ;  
LECTURER ON MATERIA MEDICA AND THERAPEUTICS ;  
SOMETIME HOUSE PHYSICIAN AT UNIVERSITY COLLEGE HOSPITAL ;  
PHYSICIAN TO THE FARRINGDON GENERAL DISPENSARY, &c.

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TO  
EDWARD SCHOLFIELD, ESQ., M.D.

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MY DEAR SIR,

Permit me to inscribe this little volume to you as a testimony of my sincere respect for your professional talents and moral excellence, and as an expression of my sense of the interest you have taken in its progress, as well as the kindness with which you have assisted me in collecting many of the materials necessary for its execution.

I could have wished that the work had been more worthy of your acceptance, but such as it is I trust you will receive it as the best tribute I could offer of my esteem for your character, and the value I attach to your friendship.

I remain, my dear Sir,

Your's very sincerely,

EDWIN LANKESTER.

*London, June, 1842.*



## ADVERTISEMENT.

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My readers will not perhaps deem it out of place, if I state here the origin of the following pages.

77                    6                    222                    a temporary resident in the neigh-

### ERRATA.

Page 26, for Smeaton Frags, read *Smeaton Crags*.

Page 73, for Chap. IV. read Chap. II.

Page 114, for Chap. V. read Chap. III.

write a new one.

Should I succeed in exciting an interest in a locality which has afforded me much satisfaction and amusement, I shall be rewarded for my trouble ; and, more especially will this be the case, should I contribute, in some degree, to the comfort and restoration of persons seeking the inestimable blessing health.

An explanation may be expected of the delay that has arisen in bringing out this volume, which was announced for publication upwards of a year ago, when the materials had all been collected, and some sheets had passed through the press ; I then somewhat unexpectedly removed to London, where other professional occupations have almost entirely engrossed my time and attention. I trust that my friends and the public will deem this a sufficient apology for what might at first sight, appear unnecessary procrastination.

E. L.

43, Hart-street, Bloomsbury-square, June, 1842.



## ADVERTISEMENT.

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My readers will not perhaps deem it out of place, if I state here the origin of the following pages.

I became a few years ago, a temporary resident in the neighbourhood of Askern, and, taking an interest in the natural objects of the surrounding district, was led to inquire into the sources and virtues of its medicinal springs. Mr. Brewerton's work on the same subject being out of print, it was intimated to me that a new edition would be acceptable to, in fact was urgently called for by, the inhabitants and visitors of Askern. My intention, in the first instance, was to adopt this suggestion, but, as I proceeded, new matter so accumulated, that I found it would be more difficult to incorporate it with the original book, than to write a new one.

Should I succeed in exciting an interest in a locality which has afforded me much satisfaction and amusement, I shall be rewarded for my trouble; and, more especially will this be the case, should I contribute, in some degree, to the comfort and restoration of persons seeking the inestimable blessing health.

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E. L.

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# TABLE OF CONTENTS.

## CHAPTER I.

### *History of Askern and its Vicinity.*

SECTION I.—History of the Village of Askern.—Name—Hotels—School.—Antiquities.—Ancient Camp.—Pool.

SECTION II.—Villages in the Vicinity of Askern.—Campsall—Church—Mansions—Roman Coins.—Fenwick, Moss, Sutton, Norton, Owston, Skellow, Burghwallis, Kirk Smeaton, Little Smeaton, Smeaton Crags.—Botany and Geology.—Robin Hood's Well.—Roman Road.

SECTION III.—Sketch of the Natural History of Askern and its Vicinity.—Geology.—Magnesian Limestone formation.—Fossils.—The Mount.—Origin of holes in Pool.—Calcareous Tufa.—Deposition of Limestone.—Botany.—Lists of Plants and their Localities.—Zoology.—Animalcules.—Polyps.—Annélida.—Insects.—Crustacea.—Mollusca.—Fishes.—Birds.—Mammalia.

## CHAPTER II.

### *History and Analysis of the Mineral Waters.*

SECTION I.—History of the Spa.—Works of Dr. Short ; Pennant ; Mr. Brewerton, and Mr. Murray.

SECTION II.—Chemical Analysis.—Physical and Chemical Properties.—Experiments.—Solid and gaseous ingredients.

SECTION III.—On the origin of the Mineral Water of Askern, and its Contents.—Sulphuretted Hydrogen.—Experiments.—Professor Daniell's Views—Carbonic Acid and Nitrogen.—Salts—Organic Matter—Glairine.

SECTION IV.—History of the various Wells, and composition of their waters.—Manor Bath Well.—Terrace Bath Well.—Charity Bath Well—Rules.—South Parade Bath.

### CHAPTER III.

*On the Medical Uses of the Mineral Waters of Askern.*

SECTION I.—On the use of Mineral Waters in General.

SECTION II.—On the Circumstances attending the use of Mineral Waters.—Change of Air.—Absence from Business.—Exercise.

SECTION III.—On Baths and Bathing.—Cold, Warm, Tepid, Hot, and Vapour Baths.

SECTION IV.—On the Medicinal properties of the Waters of Askern.—Water.—Sulphuretted Hydrogen.—Carbonic Acid.—Saline substances.

SECTION V.—On the Diseases in which the Askern water is recommended.—General use of Sulphurous water.—Rheumatism.—Gout.—Cutaneous Diseases.—Indigestion.—Paralysis.—Scrofula.

SECTION VI.—Rules to be observed during the use of the Askern Waters.



## CHAPTER I. .

### HISTORY OF ASKERN AND ITS VICINITY.

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#### SECTION I.

##### HISTORY OF THE VILLAGE OF ASKERN.

ASKERN is a village in the Parish of Campsall, situated about seven miles north of Doncaster, and nine miles south of Pontefract; it is built on the edge of a rocky declivity, and borders on a plain, which spreads extensively to the north and east. The houses mostly front the plain, and are protected backwards from the prevailing westerly winds by the abrupt elevation of the limestone rock, and from the same cause, the easterly gales are arrested in their course, and modified in their effects. Though not perhaps so favourably situated as many of the more celebrated watering places of this kingdom and the Continent, Askern possesses advantages to which, it is the object of this work to direct attention.

Little of historical interest attaches to the village of Askern, and the antiquarian has sought in vain for any records or memorials of its earliest existence. Even the origin of its name is lost in obscurity, and only a guess can now be made at its etymology. Hunter, in his learned work on the Deanery of Doncaster, observes, "The name admits of analysis into the *ern*, or receptaculum of the *ask*, the popular name for a species of newt which might inhabit the margin of the pool, which is a peculiar feature of Askern." With deference to so high an authority, I venture to suggest another etymology, and would derive the name from the Saxon word *sceran*, which means "a cliff or naked rock on the dry land." It is very probable that this term in former times was peculiarly applicable to the hill behind the village, called the Mount, which, although now clothed with verdure, was at one time undoubtedly a naked rock, elevating its rugged sides above the adjoining plain. To those accustomed to trace the origin of words, it will be easily conceived how the Saxon word might assume its present mode of spelling, by the prefixing *a*, changing *c* into *k*, and dropping or changing the vowels. In fact, at the present time the word is spelt indifferently, Askern, Askerne, Askron, or Askeron.

At the time of the Conquest, this domain was held by the family of the Foliofs, who had extensive possessions in this part of the country; it passed

successively into the hands of the Newmarches, Gascoignes, Gargraves, and others. Miss Brooke of Gateforth, as heiress of the late Humphrey Osbaldeston, Esq., is at present a large proprietor, and Lady of the Manor. The title belonged formerly to the Humfreys; it is now in the possession of the Mellish family.

The earliest historical notice of Askern, is in the 44. Edward III., "when at the sheriff's turn for Osgodeross, held at Graystones, the jury present, on behalf of the town of Norton, that the people of Askern are bound to cleanse a certain part of Askern pool, which is a common water course, and that they have neglected to do so, in consequence of which the King's highway is overflowed and drowned, so that neither horse nor foot passengers can go along it." \*

Up to a comparatively recent period, Askern had not been a place of much general resort, and little or no temptation besides its Mineral Waters was held out to the valetudinarian to induce him to select it as a temporary residence. Mr. Brewerton, in his "Treatise on the Mineral Water of Askern," which was published in 1818, speaks of it in the following terms:—"As the village consists of farm houses and the cottages of labourers, the accommodations for visitors were, till lately, below mediocrity. Prior to the erection of the Hotel, there was only one

\* Hunter.

mean public-house, the Swan, and its principal recommendation was the honest bluntness of the landlord, Thomas Hackin, which overbalanced for a time, the coarse rusticity and inelegance of the accommodations. Besides this, there was a boarding house, where a good table and comfortable beds were provided, but the greater number of visitors had private lodgings in the village, almost every cottage being converted into a lodging house."

Since this period, however, the increasing number of visitors, has induced the proprietors in the village to engage in useful improvements, and at the present time, Askern boasts of several extensive buildings for the accommodation of strangers. The largest of these is the Hotel, which was built in the year 1808; it is pleasantly situated on the rising ground, on which the village stands, commanding a view of the lake, bath-houses, and the surrounding country. The Swan Hotel, little, if at all, inferior in point of convenience to the former, was built in 1817 by its present proprietor, Mr. Haigh, and is now a principal place of public accommodation in Askern. Besides the Hotels there are good Inns at which the daily visitor may be accommodated.

Upon the terrace, below the Mount, is an elegant Mansion which was erected by Dr. Oxley, in 1826. The wings of this building are occupied as lodging houses, the centre being inhabited by Dr.

Oxley, who has, since his residence in the place, taken a lively interest in its welfare ; and, as physician to the Bath Charity, still assiduously devotes the fruit of his long experience to the relief of those whom this excellent institution enables to resort here for the benefit of the waters.

Within the last few years many new houses have been built, and comfortable lodgings can be procured for all classes of visitors.

It was long a matter of regret to many visitors at Askern, that there was no nearer place of public worship than the parish Church at Campsall. This deficiency was removed by the erection of the Chapel in the years 1824—5, which was built by subscription, on a plot of ground purchased of Henry Keyworth, Esq. It was originally intended for the use of all denominations of Christians “holding the divinity of Jesus Christ,” but arrangements never having been made for the supply of preachers by other classes of Christians, it has been entirely supplied by the Wesleyan Methodists, and the chapel is at present the property of the Conference of that body. It is a neat and commodious building, with sittings for one hundred and fifty persons. Services, conducted by local preachers, are held every Sunday morning and evening.

During the past year, a National School has been established in Askern ; it has a double school room capable of containing 150 children, for whose

instruction, a master and mistress have been procured from London. The last Report of the Doncaster Board of Education gives the following account of this institution ; “These schools have been built upon a site granted by Miss Brooke, and the cost of erection will be, principally, defrayed by the Incumbent,” (the Rev. A. B. Wrightson,) “aided by contributions of £50. each, received from Miss Brooke and Mr. Greenwood ; £20. from Mr. Yarburgh of Heslington, and materials from Mr. Yarborough of Camp’s Mount, to the value of about £45.” The number of scholars at present (April, 1840,) is 113, 80 boys, and 33 girls. The small number of girls is accounted for by the existence of the Campsall Female Friendly Society, which admits and educates 60 girls from the neighbourhood.

On the left hand side of the road leading to York, past the Swan Hotel, is an uneven piece of ground called the Hall-garth, which is the spot on which stood the mansion known by the name of Askern Hall : it was built by Toby Humfrey, Esq., and was once, undoubtedly, the pride and ornament of the place, but scarcely a vestige of it is left. The ground is irregular from the remains of the building that are now covered by the green sod ; some interesting relics have been found here, and amongst them, a stone, bearing the coat of arms of the Humfreys, which is now in the possession of Mr. Mellor, of Askern.

One of the principal objects that attract attention at Askern, is the mass of Magnesian Limestone, called the Mount, that rises abruptly from the level of the surrounding plain, forming an elevated ridge, seventy or eighty feet in height, and extending north and south for about five or six hundred feet. At first, this elevation might be taken for an artificial production, but an examination of the rock of which it is formed, proves that it is composed of regular strata lying in an undisturbed state. From this point a fine view of the surrounding country is obtained, "The village, lake, and baths, and the well-cultivated fields of Norton occupy the foreground; in the distance, the towers and spires of several towns and villages arrest the eye, and the mansion of Lord Downe, at Cowick, forms, on a clear afternoon, an interesting object. The view is closed by the wolds of Yorkshire and Lincolnshire, as they approach on the northern and southern shores of the Humber. The prospect in other directions is less extensive, but over a richly cultivated tract of country, forming gentle undulations of hill and dale, and embellished with numerous plantations and gentlemen's seats."\*

Although the Mount must have offered advantages as a place for military operations, no remains have been found to shew that it was used for this purpose. That the district was the scene of activity

\* Brewerton.

during the period of the Roman sway in this country, there can be little doubt, from the fact of Roman coins and armour having been found, at Camps Mount, Skelbrook, and other places in the neighbourhood. A relic also, of probably an earlier date than Roman, is in the possession of Dr. Oxley. It consists of part of a stone mill for grinding corn, of the most simple construction : its form is conical, a cavity exists at the top which contained the corn, and from this proceed two small tubular cavities, one for moving the mill, the other for carrying away the pounded material.

On the southern side of Askern there is a large uncultivated piece of ground called Sutton Common. At its south-western extremity, is a portion elevated above the surrounding flat, and upon this are to be seen, very distinctly, the remains of an ancient camp. There are at present existing considerable parts of two squares on which the works stood ; these were protected by a double row of embankments, which can now be traced only on one side. In the interior of the squares are found several oval or square portions of raised ground, varying in size from four to twelve feet ; there are some of larger dimensions, which occupy the centre of one of the squares ;—these elevations stand out the more prominently from their being surrounded by a narrow trench. There is a sunk roadway leading directly through the whole camp. The soil in-



mediately beneath the embankment and squares consists of sand and clay, and differs very much from that of the common surrounding it, which is composed of peat-earth for several feet deep. In conjunction with my friend Mr. Schmitz, I made some search with a spade, in order to ascertain if any remains could be found that would throw light on the history of this ancient work, but, with the exception of a few large stones, that presented evidence of having been worn in the situation they were placed in, we saw nothing to assist our conjectures as to its origin. In the neighbourhood, I cannot find that there is any history or tradition connected with this spot. There can be no doubt that there has been an encampment here, but whether Roman, Saxon, or ancient British, admits perhaps of question. In favour of its having been Roman is the form of the work, which is similar to Roman works of this kind in other places. It is also situated between Doncaster and York, at both of which towns the Romans had stations, and is not far from the rig or way that existed between those two places. Roman coins have been found at Camps Mount; and the Parish of Campsall, in which this remain is situate, may have derived its name from the Roman *campus*. In favor of its being British or Saxon is its situation, as at the time it was formed, the whole district was probably thickly wooded, and would be an unlikely spot for the

Romans to encamp upon ; but as a place of protection against invaders, the Britons or Saxons would be likely to select such a situation. Although now in the midst of a swamp, it is probable from its geological structure, that it has always been quite dry, and was at one time surrounded by trees, the remains of which are at present very abundant around it; they are found also through a great part of this level district. An eminent antiquary speaking of the fallen trees found at Hatfield Chace, about eight miles from Askern, and situate on the same level says, “ that these trees were natives of the place and cut down by the Romans ; because the Britons, when defeated in battle, retired into such morasses and woods, and were secure, but continually making sallies out and retreats in again. By these sallies the Romans were so tormented, that public orders were issued out for the destroying all their woods ; and it is observable that the Emperor Severus, who died at York, is said, in a few years, to have lost 50,000 men in this work, which was performed partly by fire, and partly by axes, &c. cutting down such as remained. The burnt wood and fircones, taken out of the mosses, have upon them evident marks of the tools wherewith they were hewed down ; these, by their falling, occasioned the mosses, by the stagnating of the waters and perpetual deterrations.” \* On Hatfield Chace there

\* Thoresby, in Miller's Doncaster, p. 302.

are the remains of a Saxon camp, and history relates, that a battle was fought there between Ceadwalla, King of the Britons, and Penda, the Pagan King of Mercia, against Edwin, the first Christian King of Northumberland, in which Edwin, and Offride his eldest son, were slain.

One of the most remarkable features of Askern, is the Pool, a large piece of water covering about six or seven acres, which contributes to render the aspect of the place more pleasing, whilst the several boats on its surface, offer to the visitor a healthy and popular amusement. It is supplied by several springs, some of which empty themselves immediately into the Pool, and the water is retained within its present bounds by artificial means. An accumulation has evidently existed here from time immemorial, as one of the first incidents mentioned with regard to Askern, in the public history of the country, relates to the keeping of this water from overflowing the highways. In the midst of the Pool, two islands have been made, which form picturesque objects from the adjacent walks. The depth of this lake is very variable, in some parts not exceeding one or two feet, whilst in others it is not less than twenty feet. The latter depth is attained in one of those "profound pits" spoken of by Dr. Short, in his work on the Mineral Waters of Yorkshire, published in 1734, "the depth whereof," he states at that time, "was not known." On a bright

day the bottom of these pits may be clearly seen ; their sides are very precipitous, and are covered with various kinds of aquatic plants. To the south of the Pool is another piece of water, into which several springs empty themselves ; it has also a depth of eighteen or twenty feet. About a mile to the south-east of Askern, is another Pool, covering seven or eight acres ; it is said to be very deep. The cause of these deep holes, is a subject of frequent speculation amongst those who visit Askern, and many ingenious conjectures have been made as to their origin ; they are, however, nothing more than well known phenomena, which geological science is capable of explaining.

Askern cannot boast of being the birth-place of those that are known to fame ; it was however notorious, during some part of the last century, as being the residence of Joshua Iveson, who had the reputation of a wily wizard, and was consulted by his credulous countrymen from far and near. Such was the disturbance produced by his predictions, that the magistrates were obliged to interfere ; they stopped his proceedings, and ordered his astrological books and apparatus to be burned. It was fortunate for the poor man that he escaped thus easily, for the public have often turned round upon these unhappy creatures of their own credulity, and made the witch and the wizard pay the cost of popular folly.

Askern, being more a place of resort for the invalid, than for those who seek, in change of scene, a relief from the toils of business, or the listlessness of inactivity, has few attractions in the form of what are called public amusements. To the fashionable and the gay, it would certainly come under the designation of a stupid place ; to those, however, who can derive pleasure from fields, and woods, and water, from the never-failing variety of rural scenes and objects, Askern will afford abundant subjects to employ and interest the mind. Nature does not here, it must be allowed, present her bolder and more majestic forms, but there is ample field to gratify that hallowed feeling which

“ Is born with all, the love of Nature’s works.”

There are many pleasant walks in the neighbourhood of Askern, and it is only to be regretted, that the parishioners do not pay more attention to keeping them in good order ; if this improvement were effected, it would add much to the comfort and pleasure of the invalid and visitor, as well as advance their own interest.

## SECTION II.

## VILLAGES IN THE VICINITY OF ASKERN.

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THE following short notices of villages and places near Askern, have been drawn up with a view to assist the visitor in exploring the neighbourhood; they may not be uninteresting to those also who reside in the district.

CAMPSALL.—This village is situated about a mile to the west of Askern, and may be reached either by the high road, or by a footpath across the fields; the latter is an agreeable and picturesque walk,—the church and the hall, the park of Campsall, with its woods and lake, diversifying the scene. The houses in this village bear marks of great age, and whilst the older are falling to decay, no new ones supply their places. The last three census present the population as nearly stationary. The following table, copied from the report of the

Doncaster Board of Education, gives the increase and decrease of the several villages in the parish of Campsall, during the last thirty years.

	1840.	1821.	1811.
Campsall Inhabitants, .. .. .	386.	389.	393.
Askern           "     .. .. .	256.	159.	113.
Norton           "     .. .. .	643.	668.	558.
Moss             "     .. .. .	269.	242.	109.
Fenwick         "     .. .. .	286.	295.	252.
Sutton           "     .. .. .	184.	145.	105.
	Total	2024.	1898.
		1530.	

The church stands upon a hill at the top of the village, and its handsome tower forms a prominent object for some distance round about. Hunter, in his History of the Deanery of Doncaster, has the following notice of this structure. "This is one of the few churches of this deanery, in which the ground plan was laid down upon the sacred symbol of the Christian faith. The design is a little obscured by the side aisles, a later addition, which correspond with the shaft of the cross extending nearly as far as the transepts; and there is this peculiarity, that the tower does not rise at the intersection of the limb, but is at the west end, though it is evidently of older date than even the other parts of the fabric. The four arches at the intersection, are, however, too visible to allow of any doubt that such was the design, and those arches are well deserving attention, as very early instances of the pointed arch; the pointed arch, with that

species of rude ornament, the zigzag mouldings, which are classed by writers on this subject with the decorative part of Saxon architecture. There can be no doubt that much of the church at Campsall is the church that was erected in the first century after the Conquest, by the joint efforts of the Lacis and the Reinevilles. It is dedicated to St. Mary Magdalene. The tower has some remarkable features. The door of the entrance has semicircular arches, each springing from slender cylindrical pillars, having the kind of capital called Saxon. Above it are several windows each in niches, resembling the door-way. The whole church, but especially the chancel, conveys an impression of extent and grandeur. There is a handsome oak screen between the nave and chancel, which was once surmounted by a figure of our Saviour extended on the cross, as appears from the following inscription, cut on the screen :”—

Let fal downe thy ne and lift up thy hart ;  
 Behold thy Maker on yond cross al to torn ;  
 Remember his wondis that for the did smart ;  
 Gotten without syn and on a virgin born ;  
 Al his hed percid with a crown of thorn.  
 Alas man, thy hart ought to brest in too.  
 Beware of the devyl when he blawis his horn  
 And praye thy gode aungel conveye the

The last word is wanting.

There are no monumental memorials of the older aristocracy of Campsall; the Braytons, Saint



Pauls, and Fletchers : but there are several of the later families ; the Yarboroughs, Franks, Ramsdens, and Humfreys.

At the east end of the church is a beautiful tablet executed by Flaxman, consisting of a group in alto-relievo, of the sick, the aged, the blind, and the young, who are receiving attention from two females ; this monument was erected in 1794, in memory of Thomas Yarborough, Esq., his wife, and several branches of their family.

Near the church is Campsall Hall, erected by the late Bacon Frank, Esq., who was, for many years, an active magistrate for the West Riding of Yorkshire. The house is at present occupied by Charles Thorold Wood, Esq.

One of the ancestors of the Frank family who owned the estate at Campsall, was Richard Frank, Esq., Recorder of Doncaster and Pontefract, and one of the earliest members of the Society of Antiquaries. He made a considerable collection of manuscripts with the view of writing a topography of the West Riding ; these, together with the papers of Dr. Johnston, of Pontefract, who amassed a still larger amount of materials for forming a topography of the county, are carefully preserved in the library at Campsall. (Hunter, Vol. 2, p. 466.)

The village has for many years been favored by the existence of a Female School, which was founded by the Misses Frank ; these ladies, feeling

interested in the welfare of their humbler neighbours, undertook to educate, at their father's house, a few poor girls in reading, sewing, &c. The school, at first, depended solely upon the exertions of these three young ladies; they defrayed the whole of its expenses, and taught the children, (sometimes to the number of sixty,) without the least assistance from any other person. The institution thus commenced, was not allowed to cease when its founders could no longer attend to its duties. The neighbouring gentry came forward to its support; and about thirty years since, the pretty rustic building that stands on the road to Norton, was erected, at an expense of about £500, for the accommodation of the scholars, and a resident mistress was appointed. The school is connected with a Benefit Society, the principal features of which are, that each member on her marriage receives two pounds from the private funds; ten shillings on the birth of each child; and when disabled by sickness, four shillings a week. On the death of a member, two pounds are allowed towards paying the funeral expenses. Members who have contributed to the fund forty years, are allowed four pounds per annum, and are exonerated from further payments: this regulation came in force the present year (1840.) The annual contribution of each member is six shillings and sixpence. This institution has been the means of effecting much real good in the neighbourhood, and is well worthy of imitation.

A Society for the Acquisition of Knowledge, was established in 1837; its library, consisting of about 300 volumes, was formed by purchases from funds raised by the villagers, and by presents from Mrs. Wood, and Mr. Yarborough.

On an elevated position overlooking the village, stands Camp's Mount, formerly Brayton Hall, the seat of George Cooke Yarborough, Esq. This mansion, commanding an agreeable and extensive prospect, is surrounded by a well wooded park; near the house are several very fine specimens of the cedar of Lebanon, the growth of upwards of a century; one of these trees was blown down by a high wind, on the last day of the year 1830, in which ninety five zones could be distinctly counted.

During the past summer, (1840,) an interesting discovery was made by some workmen who were employed in forming a new road in the grounds of Camp's Mount. Whilst taking away the external soil from the rock below, they came upon some stonework, which when cleared, resembled the foundation of a house; near it a hole was perceived in the rock, which contained a large number of coins about the size of a farthing. They were covered over with a blue rust, and on being examined, were found to be Roman copper coins or medals. There were about two hundred of them, which are now in the possession of Mr. Yarborough. They are in a good state of preservation, and on most of them

the inscriptions are readily made out. On one side they bear the head of an Emperor or Governor, whilst the reverse has some emblematic design. Although the head is in many instances the same, yet in every case the reverse side presents a different design. The inscriptions on the coins are the names of Gallienus, Claudius, Quintilins, Tetricus, and Victorinus. These names belong to the history of Rome's declining greatness. Gallienus was the son of Aurelian, and was invested by his father with the joint administration of the government of the Roman Empire, about A.D. 253. He was one of the most accomplished, but at the same time the most indolent and luxurious of the Roman Emperors. It was during his reign that there were so many pretenders to the imperial purple; these, although only nineteen in number, were called, in imitation of Grecian history, the Thirty Tyrants; amongst the names transmitted to us, we find those of Victorinus and Tetricus. Victorinus, the son of Victorina, early fell a sacrifice at Cologne to the revenge of his fellow citizens. Victorina, though not occupying the throne, possessed full power in the provinces of Gaul, and was enabled successively to invest her favourites Marins and Tetricus with the sovereignty, and in their names she exercised all authority. Tetricus reigned over Gaul, Spain, and Britain, and at last treacherously delivered himself into the hands of the Emperor Aurelian.

Claudius the successor of Gallienus, was, from his successful efforts against the Goths, called Gothic Claudius, and was one of the few Roman Emperors who added lustre to their high station. Quintilius, the brother of Claudius, assumed the imperial dignity in Aquileia on the death of his brother; he was bled to death by his own orders, after a reign of only seventeen days.

From this account, it would appear that the period at which these medals were struck, was A.D. 260—270, and that they were designed to commemorate various events that had occurred in the reigns of the above Emperors.

For what purpose they were amassed, and buried in such a place, it is not quite clear; as their pecuniary value would not, at any time, have been great, it is probable that they were collected by an individual, as memorials of the eventful times in which they were issued, or that they were deposited as a memorial of the period in which some building was erected.\*

\* On this last supposition, my erudite friend, Mr. Schmitz, observes in a letter, “the conjecture that the coins have been deposited as a memorial of the period in which some building was erected I cannot share, for on such occasions, *only* such medals as were coined under the one emperor then reigning were deposited, and moreover, one or two specimens of *all* the coins that were struck in that year in which the foundations of the building were laid. I still adhere to my old conjecture that the money was deposited by some poor soldier in danger, who wished above all things, to save his little stock.”

Not far from the place where the coins were found, the workmen struck upon a kind of paved way, extending several hundred yards, one portion of which projects in a circular form on each side; the stones of which it is composed are the Magnesian Limestone of the neighbourhood; on the upper surface they are of a dark colour, and are much worn. To what period this work may be referred it is difficult to say, but its great depth beneath the soil indicates that it has been covered a considerable length of time.

FENWICK is situated on the extensive sweep of flat country to the north east of Askern. The once celebrated family of Hastings had their residence here; they are now extinct, and but little remains of their princely mansion to attest its former magnificence.

Several pieces of armour have been found here and near Sykehouse by persons employed in draining this district. The bones of animals of various kinds have also been taken from the peat soil; those of the stag have been met with in many places, and specimens of the antlers are to be seen in the village. Trees, chiefly the oak and the birch, are frequently found; Mr. Moate, of Fenwick, informs me that, during a season of drought, many were dug up, their locality being indicated by the absence of vegetation over the spot where they lay; so closely did this dearth of vegetation follow the form

of the tree, that the course of the trunk and branches was distinctly marked upon the surface of the earth.

Moss is two miles to the east of Askern; its name, like that of Fenwick, is probably derived from the natural features of the flat district in which they are situated.

SUTTON is a small village about a mile south of Askern; it may be reached by a pleasant walk which passes over the Mount, and through the fields.

NORTON, about half a mile beyond Campsall, is the largest village in the parish. The family of the Ramsdens formerly held property here, which, together with an estate at Fockerby, was given by Mrs. Mary Ramsden to trustees, for the erection of additional buildings, at Catherine Hall, Cambridge, and for the support of six fellows and ten scholars at that college. She directed that they should be called Skern's fellows and scholars, out of regard for the memory of her kinsman, Robert Skern, who had heretofore been a benefactor to the same college; and that natives of Yorkshire and Lincolnshire should have the preference. There was formerly a free chapel or priory at Norton, of which but little now remains.

OWSTON is a pleasant village situated to the south of Askern; it may be reached by the road leading to the church, and by a footpath which

passes through the grounds of Owston House, the seat of Philip Davies Cooke, Esq.. From Owston there is a foot road to Skellow; a walk through these villages and Burghwallis will be found one of the most agreeable in the neighbourhood.

The Church, which is almost hidden from view by the lofty trees which surround it, is rich in monumental memorials, interesting to the antiquarian and lover of art. Amongst those which the latter should seek are two beautiful monuments by Chantrey, erected to the memory of the late Mr. and Mrs. Bryan Cooke. There are also memorials of the older aristocracy of Owston, one of which, to the memory of Robert Hatfield and his wife, bears the early date of 1409.

SKELLOW is a neat village in the parish of Owston. Skellow Grange, the seat of Godfrey Higgins, Esq., will be interesting to many as the scene of the literary labours of the late Mr. Higgins, the results of which have been given to the world, in his *History of the Celtic Druids*, and in a posthumous work called *Anacalypsis, an attempt to draw aside the veil of the Saitic Isis*. Mr. Higgins entitled himself to the gratitude of his countrymen, by the energetic manner in which he so successfully endeavoured to reform the management of the Lunatic Asylum at York, and for the principal part he took in the establishment of the Pauper Lunatic Asylum at Wakefield.



BURGHWALLIS, a clean neat village, is situate a mile and a half to the south-west of Askern; it stands on one of the limestone hills of the district, and, on approaching Askern from the Doncaster road, its church, parsonage-house, and hall, surrounded by lofty trees, form very picturesque objects. The church is of the simplest form, consisting only of nave and chancel, with a tower at the west end. The same kind of double window under a semicircular arch is seen here, as at Campsall and Owston, which Hunter thinks an indication that the three churches were built at nearly the same period.

In one or two of the above named villages, it is much to be wished, that a little more attention were given to the footpaths and roads. It is not only unpleasant to the visitor to meet with dirt and disorder where cleanliness and neatness should exist; but such a state is also opposed to the health and morality of the inhabitants.

KIRK SMEATON, is about three miles from Askern. The church stands pleasantly on the brow of a hill; "the nave and chancel," says Hunter, "may, without the slightest chance of error, be referred to a period before that of Domesday Book. They are separated, as usual, by an arch which springs from cylindrical columns, and is ornamented with zigzag mouldings; but here the columns are clustered and the arch itself is pointed. The capitals are Saxon. The windows have been

altered, and a tower and a north aisle have been added at a later period.”

LITTLE SMEATON, in the parish of Womersley, is built on the side of another hill, on the opposite bank of the river Went. Going along the banks of this stream, which is about 30 feet above the level of the sea, we are introduced to a district known by the name of Smeaton Prags, which though not very generally known, is well worthy of a visit. The river, here very narrow, runs through a valley extending from Went Bridge to Smeaton, the sides of which are formed by steep and precipitous cliffs of Magnesian Limestone, which, in many places, projecting their white rugged surfaces from amongst the verdure of the woods and hill sides, form exceedingly picturesque objects. The valley extends about a mile and half, and, from the various irregularities which its broken cliffs present, the cottages of the peasantry, the woods on the hill sides, the villages of Smeaton and Went Bridge, and the distant prospects obtained from the hills, one of which is about 380 feet high, exhibits a variety of scenery which few spots in this part of Yorkshire can afford. It is, however, only accessible to the pedestrian, and attempts are constantly being made to exclude even him from the enjoyment of this pleasant walk; but it is to be hoped that a way will always exist for the Rambler amongst these agreeable and interesting scenes.

In this district the Botanist will find many of the objects of his search, which do not occur in any other locality of the neighbourhood. On the borders of the Went, the flowering Rush (*Butomus umbellatus*) grows in great abundance, and in the midst of its waters the Yellow Water Lily (*Nuphar lutea*), and the Arrowhead (*Sagittaria sagittifolia*) mingle their beautiful flowers; whilst the Bull-rush (*Scirpus lacustris*) sends up its stems from six to ten feet in height, here and there forming little forests, that entirely conceal the stream. On the highest point of one of the hills, on some mounds that appear to be the remains of an ancient camp, the elegant Pasque-flower (*Anemone Pulsatilla*) grows in profusion; and the delicate Wood-sorrel (*Oxalis Acetosella*) is very plentiful in the plantations at the west end of the valley. \*

The Geologist also will find this one of the best places for examining the structure of the Magnesian Limestone, as well as for collecting the organic remains which it contains. The extensive quarries that were recently made at several points of the valley, and the working of which has been given up as a bad speculation, are the best spots for collecting geological specimens and making observations. At Went Bridge, the turnpike road between Doncaster and Ferrybridge passes through a deep cut made in the hill which rises abruptly on the north side of

\* For other Plants, see Catalogue.

the stream. Here the geologist has a good opportunity of seeing the Magnesian Limestone as it overlays, what Sedgwick calls, the Lower Red Sandstone. It is also a good general illustration of the manner in which rocks overlay each other.

This valley seems to have been, in a great measure, formed by the denuding action of water ; a much mightier stream than that which now flows through this quiet glen, having once forced its waters through these rocks in its course to the ocean, which, at that period, cannot have been far distant. The collection of gravel at the eastern extremity of the valley, may have owed its origin to such a cause. Previous to the passage of the stream in this direction, a considerable dislocation of the strata had probably occurred, and thus determined its original course.

On the left side of the valley as we proceed to Went Bridge, on the top of one of the most elevated of its precipitous sides, are to be seen considerable remains of embankments. Some portions are so high as to present the appearance of mounds in the distance. This spot has doubtless been the scene of military operations, but, at what period, the imperfect state of the remains affords but little clue. They differ very much from those before referred to on Sutton Common ; the embankments are much higher, and the ground has fewer indications of an artificial character, by which to judge

of the kind of works that existed upon it; their height would seem to indicate an earlier than Roman origin; they are probably the remains of an ancient Brigantine camp.

ROBIN HOOD'S WELL is situated on the old north road, about midway between Ferrybridge and Doncaster, and also on the line of the great Roman road from Lincoln to York. From the bones, coins, and other relics found here, it has been conjectured that the Romans had a settlement near this spot. Hunter supposes that this Well may be one of the "fontes lucidi juxta publicos viarum transitus" which, according to the venerable Bede, King Edwin supplied with ladles for the refreshment of the traveller. This is rendered probable by the fact that Edwin had a *villa regia* at Doncaster.

The virtues, piety, and misfortunes of King Edwin, have conspired to render him one of the most interesting characters in British history. His reign, which was to his subjects one of the happiest in the Saxon Heptarchy, continued seventeen years. Speaking of him, William of Malmesbury says, "not only the English, Scots, and Picts, but even the Orcades and all the British islands, dreaded his arms and adored his grandeur; no public thief nor housebreaker was found in his time; the adulterer was a stranger, and the spoiler of other men's goods afar off; his glory shines even to our own age with splendour."

There is no authentic account of the well ever having been frequented by the famous individual from whom it takes its name. It is not, however, improbable that Robin Hood and his party of freebooters may have occasionally refreshed themselves at this spring, and thus have given to it the immortality of his name.

Under the name of Roberts-place, this spot seems to have been in olden time a place of resort for games and amusement at the holydays of Easter, Whitsuntide, &c. Braithwaite, in his *Itinerarium Barnabæ*, has the following singular notice of this Well:—

Nescit sitis artem modi,  
Puteum Roberti Hoodi  
Veni, et liquente vena  
Vineta catino catena  
Tollens sitim, parcum odi  
Solvens obolum custodi.

Thirst knows neither mean nor measure,  
Robin Hood's Well was my treasure ;  
In a common dish enchained  
I my furious thirst restrained ;  
And, because I drank the deeper,  
I paid two farthings to the keeper.

Evelyn, having visited it in 1654, thus writes:—  
“ we all alighted in the high-way to drink at a crystal spring, which they call Robin Hood's Well ; neere it is a stone chaire, and an iron ladle, to drink

out of, chained to the seate." The ladle and seat are no longer to be seen, but in their place is a rustic dome, which, during the last century, was erected by the Earl of Carlisle, according to a design of Sir John Vanbrugh; one of the Gales on this occasion wrote these verses :—

*Nympha fui quondam, latronibus hospita sylvæ,  
 Heu nimium sociis nota, Robine, tuis,  
 Me pudet innoeuos latices fudisse seelestis,  
 Janque viatori pocula tuta fero.  
 En pietatis honos ! Comes hanc mihi Carliolensis  
 Ædem sacrauit, qua bibis, hospes, aquas.*

I venture to subjoin the following translation :—

Here once a nymph, as friendly to the robber-band I stood,  
 Alas too closely known, to thy companions Robin Hood,  
 It shames me much, that my pure streams to wicked men were  
 poured,  
 But now the cup of safety to the traveller I afford,  
 Behold the grateful tribute Carlisle's lord did raise,  
 The dome wherein thou drinkest, stranger, speaks his praise.

The Well is in the parish of Skelbrook, and stands opposite the entrance to the park, which is one of the oldest in the kingdom. About half a mile from the Well, and between it and Barnsdale Bar, is a small building called the Summer House, which was erected by the late Mr. Frank of Campsall; it stands high, and commands a very extensive view of the surrounding country.

**ROMAN ROAD.**—On the old north road between Doncaster and Barnsdale Bar, are to be seen many vestiges of the old Roman Rig or Way; it has been called the Watling Street Way, a name given to other roads supposed to have been made during the time of the Roman invasion. These remains are on the left as we proceed north from Doncaster; in some places the bank is unbroken for a considerable distance, as in an enclosure near Barnsdale Bar; whilst, in others, it has been destroyed to form part of the present high road, or has been levelled for the purpose of cultivation; it is composed of loose portions of the limestone of the district, and has no pavement upon it.

A Roman helmet was found, not long ago, near the Red House, as also several Roman coins near Robin Hood's Well; the coins bear similar images and superscriptions to those discovered at Camps Mount.

In the neighbourhood are the remains of other roads, which have evidently been used by the Romans; but it is probable that many of these were ways and tracts formed by our early British ancestors. \*

\* Dr. Boothroyd in his History of Pontefract observes, "A vicinal way" (to the great road) "appears to have passed through the old town" (of Pontefract) "in a south direction to Darrington, Wentbridge, Smeaton, Campsall, and Hatfield." I have not been able to recognise any vestiges of such a way.



It would be inconsistent with the limits of this volume, to give any account of objects of interest that are situated at a greater distance than those above named. Amongst the places worthy of a visit, and within the compass of a day's excursion from Askern, may be mentioned the towns of Doncaster and Pontefract ; Sprotborough Hall and Gardens ; Conisborough Castle ; Roche Abbey ; the Rockingham China Manufactory, near Swinton ; Wentworth House ; Walton Hall, near Wakefield, the seat of Charles Waterton, Esq., and the Abbey Church of Selby.

## SECTION III.

SKETCH OF THE NATURAL HISTORY OF ASKERN  
AND ITS VICINITY.

To persons whose studies have been directed to a philosophical examination of the various productions of nature, there is no spot of the earth so desolate, nor any season of the year so dreary, as not to supply abundant matter of interest. In the following remarks I shall not write so much for the professed naturalist, as for the general reader, and with this view, I shall point out the most prominent objects of interest belonging to the Mineral, Vegetable, and Animal Kingdoms, as they have occurred to my own observation, without at all attempting to give a complete natural history of the district.

## I. GEOLOGY.

Askern is situated upon, and about midway from the two extremes of a long line of secondary formation, extending from Nottingham, through the counties of York and Durham, to the borders of the Tyne, known by the name of Magnesian Limestone. It is exceedingly narrow, and runs almost directly north and south; it is bounded on the east by the New Red Sandstone, and on the west by the Coal measures. Throughout nearly its whole course, it is elevated into a terrace or escarpment, which is intersected by the passage of rivers, and by vallies, formerly the beds of rivers; these irregularities have arisen from the various causes of disturbance, to which the earlier secondary strata have been more particularly exposed. The general inclination of this stratum is towards the east, where it dips under the new red sandstone; this dip of the limestone is to be seen in the neighbourhood of Askern, although from the large accumulations of gravel and decomposed vegetable matter upon the sandstone, its relative position cannot easily be detected. On the west, the coal strata are inclined under the magnesian limestone, and have a mean dip of about one yard in twenty; the limestone does not, however, lie in similar planes; this is accounted for by the violent action to which the coal strata were exposed

previous to the deposition of the limestone, which rests in an irregular manner, or *unconformably*, on the great coal bed of this district; as it is in some places, probably very near to, and in others, very distant from the coal, it cannot be depended on as an indication of the presence of coal in any given district. To those acquainted with the magnesian limestone, the variety of character which it presents in different districts, will be perfectly familiar; portions of sandstone, of mountain limestone, and of other rocks are frequently blended with it. On the southern side of the Mount, a large deposit of this kind commences, which runs in a south-west direction, through the parks of Campsall and Camps Mount; it afterwards takes a westerly course, and is seen at Smeaton and Womersley. Some animal remains have been occasionally found in this gravel; as they belong to families of animals that at present inhabit the earth, this deposit must have been formed at a period very much later than the rocks on which it rests; it may not only be separated into sections, each exhibiting the same general character throughout large districts, but may be extensively subdivided according to the varied nature of its component parts. An eminent Geologist of the present day, (Sedgwick, Geological Transactions, vol. iii.) has lately pointed out several distinct groups in this formation, the principal direction of which, as they exist in the vicinity of Askern, may be seen on

reference to the map. On the western side will be found the coal measures, which are composed of layers of clay, marl, sandstone, and thin beds of coal. The next line of formation, which has been by some referred to the coal measures, and by others to the magnesian limestone, is called the Lower Red Sandstone; above this lies the great bed of the magnesian limestone, exhibiting, in some places, marl-slate, and marls of various colours, with compact and shelly limestone; the chief bulk is a yellow-coloured limestone, which is worked at Smeaton and many other places, and is used extensively in the construction of buildings. Sulphate of lime, Gypsum, is quarried in the district colored red on the map; it is found mixed with marl and clay, and generally lies some depth below the surface. It has been exposed at Askern, Brotherton, Campsall, Norton, and Wadworth; at the last named place it was penetrated in the operation of boring for water, and gave out a spring impregnated with Sulphuretted Hydrogen, which still exists. It may be seen in quarries in the neighbourhood of Askern, and is met with in layers of from one to five inches thick, by persons engaged in sinking wells. Beyond the line in which gypsum appears in the greatest quantity, the magnesian limestone assumes a slaty character, and presents layers of variable thickness: it is occasionally met with capping some of the hills. The boundaries of this slaty limestone are

tolerably well defined; there is, however, a gradual thickening of the layers as we proceed west, the thinnest being seen in the quarries at Askern, where the formation is about to disappear. Its consistence varies much; in some places the layers are very hard, whilst in others they are elastic, like the flexible limestone of the Durham coast.

The Limestone formation, in this district, is remarkable for its dislocations; besides that noted in the map, between Hemsworth and Barnsdale there is a large one evident in the Park at Campsall, where, in a quarry near the road leading from Askern to Campsall, it will be found that the lowermost bed of the Magnesian Limestone, which exists naturally in the valley of the Went, has suddenly made its appearance amidst the layers of slaty limestone above alluded to. This interruption to the strata is exhibited in the section accompanying the map.

There is a production known to the mineralogist by the name of Dolomite, consisting of the carbonates of lime and magnesia, which are the component parts of a large proportion of the magnesian limestone; it occurs under two forms, a coarse large-grained stone, *arenaceous* dolomite, and a finer stone called *small-grained* dolomite. These, as well as some other varieties of the limestone, have been analyzed by Professor Sedgwick, and the quantities of carbonate of lime and carbonate of magnesia found to be equal; they contain a small portion of

oxide of iron, and other impurities, to the amount of about two per cent.

These ingredients are also met with in a more *compact*, or in a *laminated* form, and have been named according to their physical appearance; when the rock is of a softer consistence, the presence of a larger amount of carbonate of lime is indicated; one variety called earthy magnesian limestone, is composed of two parts of carbonate of lime, and one of carbonate of magnesia. Beds of an irregular concretionary character sometimes occur, which are entirely composed of carbonate of lime; portions of these, when broken, exhibit the appearance of an aggregation of small round particles, like the ova of insects, or the roe of a fish, and resemble the formation called Oolite: this variety is met with in the quarries between Campsall and Sutton. Professor Sedgwick describes a formation of this kind, on the Durham coast, consisting of very large globular masses, resembling at a distance a huge pile of cannon balls. Some of the rocks in this formation are composed of large masses of various kinds of gravel, agglutinated by the deposition of lime and magnesia, and have been named on that account Brecciated rocks.

In examining the internal structure of the limestone, every one will be struck with the great variety of singular forms that it presents, many of which resemble organic remains, but cannot be

ascribed to such an origin. Amongst these are the Oolitic and Botryoidal forms, both of which are referable to an inorganic origin.

In the quarries of Askern and Campsall, round or oval projections are seen, which vary from a pin's head to several feet in circumference; the layers of which they are composed are continuous with those of the limestone, and seem to be formed by some foreign substance serving as a nucleus upon which the limestone is deposited layer after layer; in some cases, the nucleus may be formed by the escape of carbonic acid or other gas, for I have frequently observed that the protuberance is hollow within.

There is another class of bodies which have a conoidal form, the base being always uppermost; their size ranges from that of a pea to that of a large pear; they are not continuous with the layers of the limestone, but lie in distinct cavities, from which they may be removed almost entire, by a blow of the hammer. The cavities in which these bodies are found have probably been at first made by the rotatory action given by running water to a small stone, or other substance, whilst the limestone was forming; a fresh deposit having afterwards taken place from the water: cavities of this kind may be frequently seen in streams running over loose sand, or other matter.

Another striking feature in the physical character of the magnesian limestone is, the existence,



in some places, of an immense number of cavities, which are frequently lined with beautiful crystals of carbonate of lime; some of these cavities are very small, as in the Oolitic limestones; they are to be seen at Smeaton several feet square: the greater proportion of them contain crystals, and vary in size from a marble to an orange. Some geologists imagine that these cavities have been formed by the deposition of the rock upon gelatinous animal bodies, which, being gradually removed by decomposition, have left their mould or cast behind: others suppose that they have originated from the escape of gaseous matter, which, whilst the rock was hardening, was incapable of rising to the surface; by the subsequent passing of water, charged with carbonic acid, through these cavities, many of them would become enlarged by the dissolving power of this gas over the limestone.

The productions called Stalactites and Stalagmites are often found in the dislocated and overhanging portions of magnesian limestone; the former are long, depending like icicles; the latter are flat, and thinly extended over the surface of the rock: at Askern many beautiful specimens of stalagmites have been taken from the quarry.

There is no great variety of minerals found in this rock, beyond the forms which its own constituents present: oxide of iron occurs at Smeaton: carbonate of lime, in beautiful crystallizations, in

the quarries at Askern : sulphate of lime, or selenite has been seen several times, at and near Askern. Beside these, the sulphurets of lead and zinc, carbonate of copper, the sulphates of barytes, strontia, and magnesia, chloride of sodium and quartz, are recorded by Professor Sedgwick as existing in this formation.

The Fossils of the magnesian limestone are not numerous, and, of the few that exist, a small portion only are at present named ; in fact, comparatively little has been done for the history of this formation, with the exception of the paper by Sedgwick : it is to be hoped that the author of the valuable work on the Geology of the Yorkshire Coast, will add an account of this formation, to the other results of his able and laborious investigations.

Of the Fossils in the neighbourhood of Askern, none belong to the Vertebrate division of animals, although several species of Fishes have been discovered in the limestone of Durham.

Of Shells, the Bivalves are by far the most numerous ; the *Axius obscurus* is very plentiful in the quarries at Askern, and throughout the whole district ; these shells are of various sizes ; the smaller are found grouped together, forming sometimes the great mass of the rock ; the larger specimens are met with singly, and very thinly scattered. The *Mytilus squamosus* is another bivalve, which occurs in great abundance at Smeaton, and is

generally there in company with a coral, which has not hitherto been described. Of Univalves, only a few species occur: from a quarry between Sutton and Campsall, I have obtained several specimens of an undescribed species. There are probably many other species of shells, but, from the want of any account of this formation, to which I could refer, I have not been able to identify them.

The presence of *Amelida* in the limestone, has not, that I am aware of, been noticed: I have, however, in my possession, several portions of rock, of a decidedly tubular structure, which resembles so strikingly that produced by *amelida* now existing, that I am inclined to think these specimens can have had no other origin. It is difficult to suppose them to be the production of recent *amelida*.

Of the Corallines, only two have been named; the *Retepora flustracea*, and *R. virgulacea*; I have not seen them, but have identified, in specimens from Smeaton, two unnamed species, which Professor Sedgwick has figured in the above-mentioned paper; in addition to these, there are two or three others found near Askern, probably also unnamed.

The Vegetable remains of this formation, are but of rare occurrence, and I have seen none in this neighbourhood. The Dendritic appearances, so commonly observed, bear resemblance to a *Conferva*, or to the branches of a delicate coral; they

are not, however, of vegetable or animal origin, but arise from the deposition of oxide of manganese.

The recent interesting discovery by Professor Ehrenberg, of Infusory Animalculæ in a fossil state, induced me carefully to examine the marls and clays of the magnesian limestone; I have not succeeded in demonstrating their presence.

*The Mount*, at Askern, is a portion of limestone rock, which has either been raised by some sudden convulsion from beneath, or which, on account of its hardness, has resisted the action of water, to which the strata on each side have, to a great extent, yielded: perhaps both these causes have contributed to its present form and position. The inclination of its strata is greater than that of the rocks of the surrounding district; this is clearly seen on the sides and top of the hill. Some of the older inhabitants of the village entertain a notion that it increases in height; although examples are recorded of such increase over large portions of land, in some districts of the globe, there is no evidence that tends to substantiate such an opinion with regard to this elevation.

On the eastern side of the magnesian limestone formation, lying above the sandstone, and along the lines of fault and denuded vallies, are large quantities of diluvial deposits, consisting of rounded portions of rock, of various sizes; these are, for the most part, derived from the magnesian limestone

itself. Although numerous instances are recollected of the exhumation of the bones of various other animals from the gravel pits, I have seen none but those of the deer, with the exception of a human jaw-bone, which was dug from the terrace of diluvial gravel behind the Mount, where the body, of which it was a part, had probably been interred.

In approaching Askern either from the North or South, the road passes over two considerable tracts of unproductive peat land, known by the name of Norton and Sutton Commons; they lie on the same plane with the whole of this flat district, which lying on the new red sandstone, is a part of what is known to geologists by the name of the great plain of England. On the East side of Askern this plain is covered for many miles by immense deposits of peat, a very much later formation than the gravel which is in some places covered by it. Underneath the peat, and the diluvial deposits above described, is found a layer of sand, which is, in some places, as fine and loose as though it had been recently washed from the sea; in other places it is mixed with clay, which gives to it a marly appearance: it has been used for building purposes, and, in some places, has been dug to a considerable depth, as at the pit in Campsall Park, where it is worked immediately beneath the diluvial detritus. In many of the ditches to the south of Askern, the peat has been cut through, and this layer of sand penetrated.

The sand is sometimes seen raised above the peat ; this is especially the case where there is an admixture of clay : these elevations, one of which, existing on Sutton Common, has been before spoken of, cannot be looked upon as artificial, but were, probably, thrown up by the currents of the water, which originally deposited the loose sand of the whole district.

Allusion has before been made to the holes or pits, varying in depth from sixteen to twenty feet, that are formed in the limestone rock, in the midst of the pools. Amongst other conjectures as to their origin, they have been considered the craters of extinct volcanoes, an idea which, it has been stated, Professor Sedgwick confirmed in his late survey of this district. I communicated with this eminent geologist on the subject, and have much pleasure in presenting the following extract from his polite answer to my inquiries:—" My opinion respecting the deep holes you mention, must have been misrepresented. I have a very imperfect recollection of the phenomena, but I never thought *them volcanic*. Your neighbourhood is, however, much intersected by faults and dislocations ; and I may have said that these faults were probably produced by internal igneous movement. I think it by no means improbable, that a *few thousand* years since, (or perhaps a *few hundred*,) the mineral waters of Askern were thermal. Almost all mineral

springs are connected with great faults and dislocations. When springs are thermal we have little difficulty in referring their temperature to some deep-seated volcanic action. The long continued constancy in the temperature of thermal springs, is not more difficult to understand, than the long continued action of volcanic fires under any known point of volcanic eruption. But, as volcanic fires burn out in the lapse of ages, (of which we can shew thousands of examples in geology,) so thermal springs, in course of ages, must gradually descend to the ordinary scale of temperature. The Askern springs, if I remember right, are in this condition."

Mr. Phillips, in a conversation I had with him, on the formation of these holes, remarked that water charged with carbonic acid gas will dissolve limestone, and that if springs of this nature opened into the pool, they would dissolve the rock in their vicinity, and, in the course of time, would produce cavities of very great extent. It is extremely probable that such may be the true origin of the deep pits at Askern, as the water that fills the pool, contains, when it issues from the earth, a large proportion of carbonic acid gas, which causes a solution of the otherwise insoluble carbonate of lime. This chemical action is succeeded by other interesting phenomena; the carbonic acid, on reaching the surface of the water, escapes in the form of gaseous bubbles; the carbonate of lime, hitherto held in solution

by the excess of carbonic acid, becomes precipitated immediately after the latter has escaped; its particles falling to the bottom, are deposited on the various objects lying there, and form, what are called, Petrifications. As this process goes on very slowly, the earthy precipitate displaces gradually the vegetable matter, and assumes the form of the various plants on which it rests. Considerable masses of these petrifications are obtained, in which fresh water shells, &c., are frequently seen embedded: this is an interesting illustration of the process by which large portions of the solid strata, that compose the crust of the globe, have been formed, and of the manner in which their abundant fossil remains have been entombed, and their original shapes, in many instances, so perfectly preserved. This deposit of earthy matter is known to geologists by the name of Calcareous Tufa; when it is thrown down more rapidly, and in larger quantities, as in many of the springs of Italy, and other parts of the world, it is called Travertin.

The pool at Askern, like other waters of this nature, is favourable to the growth of some kinds of aquatic plants, especially those which seem to appropriate to themselves the carbonate of lime as a nutritive material: the plant most abundant here is the Hairy Chara (*Chara hispida*) which grows in such profusion as to render its removal necessary every spring; that the carbonate of lime



aids the growth of this plant is rendered exceedingly probable by its being so prolific in waters where that substance abounds. It is well known that the tissues of these plants contain carbonate of lime, which was supposed, by Sir J. E. Smith, to be merely an incrustation upon them; on examination with the microscope, it will be found to exist in these plants, in the form of regular crystals, which are attached to the epidermis by little membranous pedicles.

Throughout the whole of the low ground surrounding Askern, large deposits of carbonate of lime are found, existing in the form of calcareous tufa, and forming alternate layers with the peat soil. Springs containing this substance are common in the magnesian limestone; the water from these, as it runs over depending portions of the rock, deposits it in the form of stalactites. Around the edges of the plunging bath, which is supplied with water from the pool, may be seen a deposit of carbonate of lime, in the form of stalactites; these are of the same nature as the concretions formed by the celebrated Dropping Well of Knaresborough. The changes which are thus effected, by many of the waters of the district, are so imperceptible, that they can only be appreciated after long intervals, and the deposit of a few inches in thickness, is perhaps the work of half a century, or more; yet, slow as this process appears, the whole mass of the magnesian limestone is probably indebted to this

cause for its origin. Professor Sedgwick, however, in the paper before alluded to, expresses his belief that this formation has been deposited mechanically; he conceives that the materials have been conveyed by water from the earlier rocks, and left in their present position. I am inclined to adopt the opinion that it has been produced by the deposition of its constituents, which had been previously held in solution by water, and, for the following reasons: I. None of the older rocks contain a sufficient amount of magnesia to account for the great quantity of that constituent of the later formation. II. The magnesian limestone has generally a more compact appearance than the sandstones of the district, which have been mechanically deposited; moreover it presents, under the microscope, a distinctly crystalline character. III. The unvarying proportions of the salts of lime and magnesia which constitute this rock, would seem to denote a chemical origin. IV. The similarity between its physical characters, and those of chemical deposits that are at present taking place; these resemblances, which have been pointed out by Mr. Lyell, (*Principles of Geology*, vol. I. p. 317,) afford additional evidence of an identity of the modes of formation.

#### BOTANY.

In my remarks on this subject, I shall confine myself to an area extending about one mile to the

North, South, and East of Askern, and about three miles to the West, including Smeaton Crag.

In order to avoid needless repetition of the names of plants, and at the same time to present a view of the Flora of the neighbourhood, I have given in the annexed tables,—I. A numerical statement of the genera and species of each natural order. II. A list of the less common plants, with their localities, following Mr. Watson's *New Botanist's Guide*, in which only those species are admitted which were found not to be common to the catalogues of eight out of twelve local Floras of Great Britain. III. A list of the plants common to the twelve counties referred to by Mr. Watson, which I have not observed in this district. IV. The names of a few plants which are but rarely seen here, and which are not mentioned in Mr. Watson's *Guide*. The natural orders are named after Dr. Lindley's *Natural System of Botany*.

TABLE I.

	Gen. Sp.		Gen. Sp.
Ranunculaceæ . . . . .	4 19	Accraccæ . . . . .	1 2
Berberaceæ . . . . .	1 1	Geraniaceæ . . . . .	1 6
Nymphæaceæ . . . . .	2 2	Linaceæ . . . . .	1 1
Papaveraceæ . . . . .	3 4	Oxalidaceæ . . . . .	1 1
Brassicaceæ . . . . .	12 17	Fabaceæ . . . . .	14 20
Resedaceæ . . . . .	1 2	Rosaceæ . . . . .	14 23
Cistaceæ . . . . .	1 1	Onagraceæ . . . . .	5 6
Violaceæ . . . . .	1 4	Lythraceæ . . . . .	1 1
Polygalaceæ . . . . .	1 1	Cucurbitaceæ . . . . .	1 1
Silenaceæ . . . . .	3 5	Crassulaceæ . . . . .	2 2
Alsiniaceæ . . . . .	5 9	Grossulaceæ . . . . .	1 3
Malvaceæ . . . . .	1 3	Saxifragaceæ . . . . .	2 2
Tiliaceæ . . . . .	1 2	Apiaceæ . . . . .	17 19
Hypericaceæ . . . . .	1 7	Araliaceæ . . . . .	2 2

	Gen. Sp.			Gen. Sp.	
Loranthaceæ	1	1	Polygonaceæ	2	10
Caprifoliaceæ	3	4	Thymelaceæ	1	1
Galiaceæ	3	10	Euphorbiaceæ	3	4
Valerianaceæ	2	4	Urticaceæ	3	4
Dipsaceæ	3	5	Ulmaceæ	1	2
Asteraceæ	13	17	Salicaceæ	2	8
Cynaraceæ	5	7	Betulaceæ	1	1
Cichoraceæ	11	15	Corylaceæ	4	4
Campanulaceæ	1	3	Pinaceæ	2	2
Ericaceæ	2	2	Equisetaceæ	1	3
Monotropaceæ	1	1	Orchidaceæ	4	7
Aquifoliaceæ	1	1	Iridaceæ	1	1
Oleaceæ	2	2	Amaryllidaceæ	2	2
Apocynaceæ	1	1	Dioscoraceæ	1	1
Gentianaceæ	4	4	Liliaceæ	4	4
Convolvulaceæ	1	2	Melanthaceæ	2	2
Boraginaceæ	4	5	Juncaginaceæ	1	1
Solanaceæ	4	4	Juncaceæ	1	4
Scrophulariaceæ	8	17	Alismaceæ	4	5
Lamiaceæ	14	23	Araceæ	1	1
Verbenaceæ	1	1	Pistiaceæ	1	2
Lentibulaceæ	2	2	Typhaceæ	2	3
Primulaceæ	5	7	Naiadaceæ	1	4
Plantaginaceæ	1	3	Cyperaceæ	4	11
Chenopodiaceæ	1	3	Graminaceæ	22	31

TABLE II.

<i>Thalictrum majus</i>	Woods near Sutton Common.
<i>Anemone Pulsatilla</i>	Smeaton Crags.
<i>Papaver somniferum</i>	Campsall Park.
<i>Teesdalia nudicaulis</i>	Smeaton Crags.
<i>Hesperis matronalis</i>	Campsall Park.
<i>Reseda lutea</i>	Smeaton Crags.
<i>Viola lactea</i>	Plantations between Moss & Askern.
<i>Silene noctiflora</i>	Campsall Park.
<i>Cerastium arvense</i>	Campsall and Askern.
<i>Hypericum dubium</i>	Smeaton Crags—rare.
<i>Geranium pyrenaicum</i>	Camps Mount Park.
<i>Rhamnus catharticus</i>	Campsall Woods.
<i>Medicago saliva</i>	Campsall Park.
<i>Astragalus hypoglottis</i>	Smeaton Crags—abundant.
— <i>glycyphyllos</i>	Campsall Park.
<i>Onobrochys saliva</i>	Between Sutton and Askern.
<i>Sanguisorba officinalis</i>	Askern—abundant.
<i>Bryonia dioica</i>	Abundant in hedge-rows.
<i>Ribes rubrum</i>	Campsall.
— <i>alpinum</i>	Woods near Camps Mount.

<i>Meloscadium repens</i> . . . . .	Ditches near Norton.
<i>Sison Anomum</i> . . . . .	Abundant.
<i>Bupleurum rotundifolium</i> . .	Corn fields near Campsall.
<i>Oenanthe pimpinelloides</i> . . . .	Askern and Campsall.
<i>Sitans pratensis</i> . . . . .	Between Sutton and Askern.
<i>Pastinaca sativa</i> . . . . .	Campsall.
<i>Lonicera caprifolium</i> . . . . .	Campsall.
<i>Viburnum Lantana</i> . . . . .	Campsall Park.
<i>Viscum album</i> . . . . .	Abundant.
<i>Asperula cynanchica</i> . . . . .	Smeaton Crag.
<i>Galium tricorne</i> . . . . .	Near Smeaton.
<i>Fedia dentata</i> . . . . .	Campsall.
<i>Dipsacus Fullonum</i> . . . . .	Road-sides—abundant.
<i>Lactuca virosa</i> . . . . .	Campsall Park.
<i>Coryza squarrosa</i> . . . . .	Smeaton Crag.
<i>Erigeron acre</i> . . . . .	Smeaton Crag.
<i>Campanula latifolia</i> . . . . .	Smeaton Crag.
— <i>glomerata</i> . . . . .	Abundant.
<i>Monotropa Hypopitys</i> . . . . .	} On the roots of Beech trees in Camps Mount and Campsall Parks.
<i>Chlora perfoliata</i> . . . . .	
<i>Linaria Elatine</i> . . . . .	Corn-fields near Campsall.
<i>Rhinanthus major</i> . . . . .	Meadows near Askern.
<i>Lycopus Europæus</i> . . . . .	Smeaton Crag.
<i>Gateopsis Ladanum</i> . . . . .	Abundant.
— <i>versicolor</i> . . . . .	Between Askern and Moss.
<i>Acinus vulgaris</i> . . . . .	Abundant.
<i>Catamintha officinalis</i> . . . . .	Sutton-field.
— <i>Nepeta</i> . . . . .	Road from Askern to Barnsdale.
<i>Utricularia minor</i> . . . . .	Askern Pool.
<i>Primula elatior</i> . . . . .	Abundant.
<i>Hottomia palustris</i> . . . . .	Abundant.
<i>Salix cinerea</i> . . . . .	Campsall Woods.
— <i>aquatica</i> . . . . .	Campsall fish-pond.
— <i>oleifolia</i> . . . . .	Campsall Park.
<i>Sagittaria sagittifolia</i> . . . . .	River Went.
<i>Orchis pyramidulis</i> . . . . .	Askern.
<i>Ophrys apifera</i> . . . . .	} Meadows between Sutton and Campsall.
<i>Tamus communis</i> . . . . .	
<i>Muscari racemosum</i> . . . . .	Campsall Park.
<i>Cotichicum autumnale</i> . . . . .	} Meadows between Sutton and Campsall.
<i>Typha angustifolia</i> . . . . .	
<i>Lemna gibba</i> . . . . .	Campsall ditches.
— <i>polyrrhiza</i> . . . . .	Campsall ditches.
<i>Carex stricta</i> . . . . .	Campsall.
<i>Poa aquatica</i> . . . . .	Smeaton Crag.

<i>Poa bulbosa</i> .....	Smeaton Crags.
<i>Bromus racemosus</i> .....	Camps Mount Park.
—— <i>erectus</i> .....	Camps Mount Park.
<i>Avena fatua</i> .....	Norton.
<i>Brachypodium pinnatum</i> ....	Campsall Park.
<i>Lolium arvense</i> .....	Campsall Lane.

TABLE III.

<i>Papaver dubium.</i>	<i>Gnaphalium uliginosum.</i>
<i>Cardamine hirsuta.</i>	<i>Melampyrum pratense.</i>
<i>Barbarea vulgaris.</i>	<i>Atriplex patula.</i>
<i>Sisymbrium thalianum.</i>	<i>Rumex obtusifolius.</i>
<i>Spergula arvensis.</i>	<i>Epipactis latifolia.</i>
<i>Stellaria uliginosa.</i>	<i>Allium vineale.</i>
<i>Arenaria serpyllifolia.</i>	<i>Potamogeton lucens.</i>
<i>Epilobium tetragonum.</i>	<i>Scirpus setaceus.</i>
<i>Ledum reflexum.</i>	<i>Carex pulicaris.</i>
—— <i>Telephium.</i>	—— <i>vulpina.</i>
<i>Adoxa Mosehateltina.</i>	—— <i>stellulata.</i>
<i>Sambucus Ebulus.</i>	—— <i>præcox.</i>
<i>Asperula odorata.</i>	—— <i>caspitosa.</i>
<i>Bidens cernua.</i>	—— <i>hirta.</i>

TABLE IV.

<i>Ranunculus Lingua</i> .....	Shirley Pool.
<i>Parnassia palustris</i> .....	Askern Bogs.
<i>Geum rivale</i> .....	Burghwallis Lanes.
<i>Saxifraga tridactylites</i> ....	Campsall Park.
<i>Hyoseyamus niger</i> .....	Askern Lanes.
<i>Pinguicula vulgaris</i> .....	Norton Common.
<i>Eriophorum angustifolium</i> ..	Askern.
<i>Anagallis tenella</i> .....	Askern Bogs.
<i>Lysimachia vulgaris</i> .....	Campsall Woods.

The flowerless plants are not less abundant in this district than the flowering ones, but their greater variety precludes a lengthened notice of them.

Of the Ferns, which are very scarce here, I have observed only the following species:—

<i>Polypodium vulgare.</i>	<i>Asplenium Ruta muraria.</i>
<i>Aspidium Flix mas.</i>	<i>Scolopendrium vulgare.</i>
<i>Asplenium Trichomanes.</i>	

The Stone-worts (*Charæ*), as stated before, grow in great quantities in the pool at Askern; this, and the lake of Campsall Park, are the only localities in which I have noticed them.

The Mosses and Lichens, as in most wooded districts, are abundant here, but I have not observed any of the rarer species.

The ditches and ponds abound with Algæ; the pool at Askern is a rich depository, and, with the changing season of the year, presents a constant succession of them. In the winter, the sides of the pool, and the decayed stems of plants, are covered with little yellow tufts, like balls of hair, which contain a great number of small three-cornered bodies, the *Frustulia Olivacea*. The mud from the bottom of the pool, where there is much recent vegetable matter, presents thousands of minute particles of a round, square, or oblong form, which possess the power of motion; many of these are the seeds of various species of Crow-silks, Quiver-worts, and Yoke-threads. Some of these small moving bodies have been classed by Zoologists amongst animals, whilst Botanists have described them as the seeds of plants; and a third class of observers have placed them in a division of the organic kingdom, by which they are distinguished from both plants and animals. One of the plants produced by these atoms, abounds in the pool; it is a Quiver-wort (*Zygnema*), whose graceful green

filaments may be seen on fine days waving backwards and forwards in the dark water of the deep pits. In the summer, the pool is sometimes almost covered with the bladder-laver (*Ulva bullosa*), which floats about like masses of green jelly. There are some forms of these lower plants which are peculiar to waters exposed to the influence of Sulphuretted Hydrogen. At the bottom of the pool, and on the sides of wells in which the sulphureous water collects, is found a *Conferva*, resembling the *C. nivea* of Dillwyn, which he long since described as existing in the waters of Croft, and which has since been discovered at Middleton and other places. During the past summer I ascertained the presence of two or three other species of *Conferva*, both in the waters of Askern and Harrogate; these plants exemplify the subserviency of the vegetable to the animal kingdom, as they are invariably accompanied by peculiar animalculæ.

The *Fungi* are abundant in this district, springing up in the greatest profusion during the later months of the year; it is then that the moss-grown branches which strew the ground of the woods at Owston are almost covered with the *Peziza coccinea*, whose carmine cups form a rich contrast to the bright green of the moss; it is amongst—

“ The beauties of the wilderness  
That make so gay the solitary place,  
Where no eye sees them.”

The Truffle and the Mushroom are exceedingly



plentiful. In a few places the giant Puff-ball (*Bovista gigantea*) attains an enormous size; on one spot in Campsall Park, where it has grown three years successively, some of the plants measured three feet in circumference. In many of the woods the fetid *Phallus* is very abundant.

The low woods of Campsall, Askern, and Owston, are favourably situated for the growth of most of the members of this protean tribe. Although much neglected, it is a highly interesting family of the vegetable kingdom; it begins to claim attention when the beauties of autumn are departing, and to the enthusiastic botanist affords ample materials for pursuing his favourite study through the winter.

#### ZOOLOGY.

In making a few observations on this branch of natural history, I shall begin with the lowest forms, and gradually ascend to those in the higher divisions of the animal kingdom; dwelling only on the facts connected with such animals as are met with in the same district to which my botanical remarks have been limited. The pools and ditches of Askern, abounding as they do with vegetable matter, are very favourable to the production of those organic beings, invisible to the naked eye, called INFUSORIA. A wine glass full of water, kept for a day or two in

a warm room, will furnish ample amusement to those who possess a microscope. Of these animalcules, one kind, notwithstanding their minuteness, are supplied with a large number of stomachs, and are, therefore, called *Polygastrica*; the other, from having round the mouth an apparatus of hairs, which they twist rapidly about, for the purpose of moving and procuring their food, are named *Rotifera*: both these kinds swarm in the waters of Askern, and may be distinguished from each other with a little care. The former are by far the more numerous; their quantity is sometimes so great as to discolor the water, and several millions have been calculated to exist in a single drop.

During the past summer, I discovered in the lake at Campsall Hall, adhering to the stones at its edge, and spreading in a radiate manner over their entire under-surface, an animal of the class POLYPIFERA, the *Plumatella repens*; it was first described by the Reverend Dr. Fleming, and by him my specimens were recognised and named. Other animals belonging to this interesting group have been found in Yorkshire, as the *Aleyonella stagnorum*, by Mr. Teale, near Leeds, but I have not observed them in this neighbourhood.

At the latter end of 1839, my attention was attracted to a peculiar substance, seen in the pools and ditches of Askern, by the following passage in Mr. Brewerton's work, pp. 8-9:—"Nearly allied

to the vegetable kingdom, is a singular substance found in a pond at the south corner of the pool, adjoining the high road. This substance is a powder of a pink or rose colour, which forms a thin covering on the sand and mud at the bottom of the pond. What its real nature may be is at present doubtful. From its lying on the surface of the mud, it appears to be specifically lighter, and this is corroborated by its remaining suspended longer than the mud when the water is agitated. At first it struck me, that it might be a powdery Lichen, but as no Lichen is described by botanists of such a colour, and vegetating in such a situation, this supposition is most likely unfounded. In attempting to discover whether it originated or not from the anthers or seed vessels of any of the aquatic plants, no satisfactory information was obtained. It may be a precipitation of lake from some vegetable matter, by the agency of a sulphureous spring that is almost contiguous, and mixes its water with that of the pond; and from the fine colour of this powder, its similarity to the lake used as a pigment is very striking."

On procuring some of this substance, and examining it by a microscope, I supposed it might be of vegetable origin, and referred it to the lowest form of vegetable matter, (*Hæmatococcus*); on keeping it, however, for some time, in water, in a warm room, I found that the water became of a

beautiful rose colour, and, on submitting it to the microscope, that this appearance arose from an immense quantity of very minute animalcules. Having thus had reason to suspect that my conclusions were wrong with regard to the vegetable nature of the pink deposit, I examined the production of the substance more minutely, and am now convinced that it is composed of the bodies of dead animalcules. It is found in very large quantities throughout an extensive district, and as old layers disappear, new ones are constantly being formed. Another remarkable feature of this deposit is, that it is not found in any of the streams of the neighbourhood which are not impregnated with sulphuretted hydrogen: so uniformly have I found this to be the case, that, far removed from the sulphur springs in use, I have been able, by the presence of this pink matter alone, to point to the locality of a sulphureous spring; on the application of silver to the mud on which the deposit rested, it was always discolored by sulphuretted hydrogen. This animalcule is often accompanied by one resembling the Vinegar-Eel (*Vibrio*), and both are seen nestling on a species of *Oscillatoria*. The existence of these animalcules, under the influence of a gas destructive to most other forms of animal life, is a striking instance of the wonderful adaptation of organic life to the varied conditions in which inorganic matter is disposed.

Of the ANNELIDA, or ring-bodied animals, we have here numerous examples; to this class belong the varied forms of worms and leeches; of the latter, several species are found in the ditches of Askern, and during a late scarcity of the medicinal leech, they were a source of profit to persons engaged in catching them. At the bottom of many of the ponds may be seen a number of little red animals, which are occasionally grouped together, so as to give the mud the appearance of being covered with large patches of blood; they are very sensitive, and on the approach of the hand, or other instrument, retire deep into the mud. I have met with them generally in the vicinity of waters impregnated with iron, and in one instance, at Harrogate, saw them in the midst of a chalybeate spring; I am not, however, aware that they are peculiar to such localities.

The *Gordius* is often seen in little pools and ditches around Askern; it resembles a large horse hair, and, by the simple-minded, is looked upon as a horse hair come to life; it derives its name from frequently twisting itself into a very complex knot; sometimes several link themselves together, and seem to form an indissoluble union. They are extremely tenacious of life, retaining their vitality for days without moisture, and recovering animation when it is again supplied to them, even in a shrivelled state. This is a property common to

many of the lower animals, and apparently to the ova of some of the higher forms; animalculæ, after having been dried for months, are said to have resumed their activity on being put into water. From the circumstance of ponds being spontaneously stocked with fish, it is supposed that the ova of these animals have been dried, and carried by the wind from place to place.

On the numerous family of INSECTS, I can do little more than throw together a few random notes; I am not a practical Entomologist, or should be able, I believe, to mention a considerable variety of forms, belonging to this interesting department of Zoology, which occur in and around Askern.

In the ditches and ponds, the *Dytiscus Marginalis* is found in great numbers, and its larvæ can be seen, at almost any time, groping about in the mud. The Glow-worm is scarce, but specimens have been taken near Stapleton during fine weather. The Burying Beetles are common, especially on the bogs at Askern. Mr. Demy, of Leeds, informs me that he once took several specimens of the very rare *Diaperis œnea* from the trunk of an old tree near the pool. In many places, the trees have suffered much from the attacks of the species of *Scolytus*, and nearly all the felled trees are, in a short time, bored by the *Scolytus destructor*, whose eggs are deposited between the bark and the wood; the marks left by it are curious, resembling the

body of an insect with a large number of long legs.

The Cock-roach may be frequently seen running over the floors of kitchens and cottages, in this district, and the Mole-cricket's song is often heard on summer evenings. The *Nepa cinerea* is a very common insect, and may be captured in most of the ditches and pools. The various species of *Aphidii*, or plant-lice, are but too common: many of them produce singular monstrosities by puncturing plants; I have observed them on the Smooth Tare (*Errum tetraspermum*), the Speed-wells, and ground Ivy; they are deposited in the bud whilst the plant is growing, and, when it has attained maturity, quite alter its character.

The larvæ of the various species of *Phryganeæ*, called Caddis-worms, are exceedingly abundant in the ditches near Askern; these insects, with their little cases, made of various materials, are sometimes so numerous as to make the bottom of the water appear a moving mass. The Ants furnish indications of their industry here: at the west end of Sutton Common, near the village, is a piece of ground, an acre or two in extent, which is entirely covered with tumuli formed by these little insects; they are from one to two feet high, and from two to four in circumference.

The species of Wasp are common; there is one the *Vespa Britannica*, which forms a conical nest,

with three tiers of cells : it opens underneath by a circular aperture, and is always attached to the branches of trees.\* I have a nest in my possession of a much smaller species, which was found on a branch of a gooseberry bush, in the garden of the Institution for the Deaf and Dumb, near Doncaster ; it is not larger than a pigeon's egg, and has only a single tier of cells, which do not exceed seven or eight, whilst those of the former are five or six hundred in number.

Many of the more beautiful of the Butterflies have localities in this district. The Silver-spot, Pearl-border, Silver-stripe, and other Fritillaries are seen in the plantations around Sutton Common ; the Peacock, Painted Lady, Red Admiral, and large Tortoiseshell, in Campsall Park ; the Marble White, at Smeaton ; the Azure Blue, and the Common Blue, on the Mount, and in the fields that lead to Sutton ; and the Ringlet, Orange Tip, Brimstone, &c., are abundant throughout the neighbourhood.

Of animals belonging to the class CRUSTACEA, many examples occur ; the ditches abound with the Fresh-water Shrimp, and several microscopic species : one of these, the *Monoculus conchaceus* of Donovan, frequently collects in such quantities, as to give a yellowness to the water. Last summer I observed the surface of a pond near Campsall Hall,

\* See *Naturalist*, Vol. II. p. 312.



which presented an almost orange colour; as I passed round it, the shades of colour varied very much; this arose from my having disturbed these little animals, and from their consequently retiring deeper into the water. Amongst them is often found the *Monoculus quadricornis*, which, from the peculiar position of its ovarial bags, has a very singular appearance.

Another of these animals (*Argulus foliaceus*), not often noticed, was common here last summer; it was found as a parasite on fishes; it is about a quarter of an inch long, and is remarkable for its large compound eyes, and a pair of suckers which it uses for the purpose of attaching itself to the fish; these act in the same manner as the bags on the foot of the House-fly and Geckoo, which, when expanded on a surface, are able to produce a vacuum, and thereby secure the pressure of the superincumbent atmosphere and water. When put into a basin with Sticklebacks, these animals swim slowly about, or adhere to the sides of the vessel, till some unwary fish approaches them, when they seize hold of it never more to leave their victim. In no instance have I seen the Sticklebacks get rid of their tormentors, although, when first laid hold of, they make prodigious efforts to escape from their grasp, and rub themselves with force against the sides of the basin. They inflict no wound on the fish, but appear to subsist on the mucus secreted by the skin

of the latter: like parasites in the higher animals, they seem to indicate a diseased state of the individual on which they are found.\*

Of MOLLUSCOUS animals, none occur near Askern, excepting those which come under the designation of Land and Freshwater Shells. The following is a list of some that were collected during the last summer; they are named according to Gray's edition of Turton's *British Land and Freshwater Shells*.

<i>Paludina vivipara</i> (Crystalline Marsh Shell.)	{ Ditches near Askern Pool.
—— <i>achatina</i> .. (Common Marsh Shell.)	Madder Close.
<i>Bithinia tentaculata</i> .. (Tentacled Bithinia.)	Askern Pool.
—— <i>ventricosa</i> .... (Ventricose Bithinia.)	Ditto.
<i>Helix aspersa</i> .. . . . (Common Snail.)	Very common.
—— <i>hortensis</i> .. . . . (Garden Snail.)	Campsall, rare.
—— <i>nemoralis</i> .. . . . (Girdled Snail.)	Common.
—— <i>hispida</i> .. . . . (Bristly Snail.)	Common.
—— <i>rufescens</i> .. . . . (Rufous Snail.)	Lanes near Askern.
—— <i>virgata</i> .. . . . (Zoned Snail.)	Readsides, common.
<i>Zonites rotundatus</i> .. . (Radiated Snail.)	Campsall Woods.
—— <i>nitidulus</i> .. . . . (Dull Snail.)	Ditto.
—— <i>tucidus</i> .. . . . (Lucid Snail.)	Ditto.
—— <i>crystallinus</i> .... (Crystalline Snail.)	Ditto.
—— <i>purus</i> ..... (Delicate Snail.)	Ditto.
<i>Succinea putris</i> .. (Common Amber Snail.)	Askern Pool.
—— <i>Pfeifferi</i> .. . (Slender Amber Snail.)	Ditto.
<i>Zua lubrica</i> .. (Common Varnished Shell.)	Campsall Woods.
<i>Vertigo edentula</i> .. (Toothless Whorl Shell.)	Ditto.

\* For a figure, and an interesting account of this animal, by Miss Dobson, see *Naturalist*, Vol. I.; see also, *Annals of Natural History*, Vol. V. p. 221.

<i>Limneus stagnalis</i> . . . . (Lake Mud Shell.)	Ditches.
——— <i>palustris</i> . . . . . (Marsh Shell.)	Ditto.
——— <i>auricularis</i> . . (Widemouthed Shell.)	Askern Pool.
<i>Carychium minimum</i> (Minute Sedge Shell.)	Campsall.
<i>Vitrina pellucida</i> (Transparent Glass Bubble.)	Campsall Woods.
<i>Velletia lacustris</i> . . (Oblong Lake Limpet.)	Campsall Lake.
<i>Planorbis corneus</i> . . . . (Horny Coil Shell.)	Askern Pool.
——— <i>carinatus</i> . . . . . (Carinated Ditto.)	Ditto.
——— <i>marginalus</i> . . . . (Margined Ditto.)	Ditto.
——— <i>imbricatus</i> . . . . . (Nautilus Ditto.)	Campsall Lake.
<i>Cycas cornea</i> . . . . . (Horny Cycle.)	Askern Ditches.
<i>Pisidium amnicum</i> . . . . . (River Pera.)	Ditto.

Of the FISHES of this district, the most numerous is the Rudd or Red Eye, (*Leuciscus eryophthalmus*;) it forms by far the larger proportion of the angler's booty; this may arise, in some measure, from the avidity with which it takes the bait, under almost all circumstances, and at all seasons; it sometimes attains here the unusual weight of from two to three pounds. The Roach (*Leuciscus rutilus*) is next to the Rudd in abundance, and is very commonly confounded with it. The Dace (*Leuciscus vulgaris*) inhabits, in small quantity, the lake in Campsall Park. The Carp-Bream (*Abramis Brama*) weighing from two to three pounds, is plentiful there; it is not often hooked, but is taken in nets. There is a smaller species, called the White Bream (*Abramis blicca*), which is still more numerous at Campsall, and is oftener taken by the angle than the former; after an examination of a large number of preserved specimens of this fish

which I have in my possession, I am much inclined to doubt whether it is other than the Carp Bream, in its young state. Next to the Rudd and Roach in frequency is the Perch (*Perca fluviatilis*), which, I am told, has been taken of a very large size from the pool at Askern. The Pike (*Esox Lucius*) is found both at Campsall and Askern; one was taken from the Pool at the latter place, a year or two ago, weighing upwards of twenty pounds. The Broad-nosed and the Sharp-nosed Eel (*Anguilla latirostris et acutirostris*), are inhabitants of the lake at Campsall. The ditches and pools abound with the Sticklebacks, of which I have observed four species, the *Gasterosteus aculeatus*, *trachurus*, *semiar-matus*, and *Pungitius*. I have seen the Bullhead or Miller's Thumb (*Cottus gobio*), in a brook at Norton, but not in any other locality.

The more common of the few British REPTILES are found here. The Ringed Snake is frequent in the fields on the limestone hills; the Blind-worm and the Viper are rare; the former I have never seen, and only one dead specimen of the latter. The Frog and Toad are numerous. The common Lizard is rather scarce. The Warty Eft or Newt exists in large numbers in a pond at Campsall, but I have never observed it in the pool at Askern.

This district, occupying almost the centre of our island, does not afford such a variety of BIRDS as those nearer the coast; the presence, however, of

boggy flats, with large pools, and a considerable elevation of the hills, are circumstances which contribute to supply here a greater number of species than many districts of a much larger extent. Of 307 British birds included in Mr. Doubleday's Systematic Catalogue, 102 species have been observed in or near Campsall, by Mr. Neville Wood; I have also received a list of 10 other species which have been preserved, or seen, by Mr. Mellor, of Askern. The following table will give the ornithologist an idea of the general character of the 112 species.

Orders and Families.	Gen.	Sp.	Orders and Families.	Gen.	Sp.
<b>RAPTORES.</b>			<i>Fissirostres.</i>		
Vulturidæ .....	1	1	Meropidæ.....	1	1
Falconidæ .....	5	8	Halcyonidæ .....	1	1
Strigidæ .....	3	3	Hirundinidæ .....	2	4
<b>INSESSORES.</b>			Caprimulgidæ .....	1	1
<i>Dentirostres.</i>			<b>RASORES.</b>		
Muscicapidæ .....	1	1	Phasianidæ .....	1	1
Merulidæ.....	1	5	Tetraonidæ .....	1	1
Sylviadæ .....	13	28	<b>GRALLATORES.</b>		
<i>Conirostres.</i>			Charadriadæ .....	2	2
Fringillidæ .....	8	17	Ardeidæ .....	1	1
Sturnidæ .....	1	1	Scolopacidæ.....	2	7
Corvidæ .....	5	7	Rallidæ .....	4	4
<i>Scansores.</i>			<b>NATATORES.</b>		
Picidæ .....	2	3	Anatidæ .....	6	6
Certhiadæ .....	4	4	Colymbidæ .....	2	3
Cuculidæ .....	1	1			

I subjoin the names of some of the rarer birds, that have been taken, or seen, near Askern.\*

\* For this list, I am chiefly indebted to Mr. Neville Wood; those marked M. are placed here on the authority of Mr. Mellor, who has all the birds in his possession, with the exception of the first, the Golden Eagle; I find it noticed in a catalogue of the Birds of the West Riding of Yorkshire, kindly sent me by the Rev. F. O. Morris, of Ordsall.

- Aquila Chrysaetos* . . . . . (Golden Eagle.) One shot at Campsall.
- Buteo Lagopus* . . (Rough-legged Buzzard.) { One shot at Askern—  
in the possession of  
Mr. Mellor.
- Circus rufus* . . . . . (Marsh Harrier) Campsall—rare.
- *cyaneus* . . . . . (Hen Harrier.) Campsall—rare.
- Otus vulgaris* . . . . . (Long-eared Owl.) Campsall Park, common.
- Salicaria arundinacea*\* . . (Reed Warbler.) Campsall—scarce.
- *Locustella*† (Grasshopper Warbler.) Campsall—scarce.
- Phitomela Luscia* . . . . . (Nightingale.) In the woods at Owston  
—thus disproving the popular opinion that it does not come  
north of the Trent; it may be heard every summer from the  
Doncaster road.
- Currucua garrula* . . (Lesser Whitethroat.) Campsall—scarce.
- *hortensis* . . (Greater Pettychaps.) Ditto—not uncommon.
- Sylvia sibilatrix* . . . . . (Wood Wren.) Ditto—not uncommon.
- Mecistura caudata*, (Long-tailed Titmouse.) Ditto—common.
- Alauda arborea* . . . . . (Wood Lark.) Ditto, rather uncommon.
- Emberiza Cirlus*‡ . . . . . (Cirl Bunting.) { One shot near Camp-  
sall.
- Fringilla Montifringilla* . . . . (Brambling.) Campsall—scarce.
- Coccothraustes vulgaris* . . (Common Gros- } Askern—M.  
beak.)
- Linaria minor* . . . . . (Lesser Redpole.) Campsall—rare.
- Loxia curvirostra* . . (Common Crossbill.) Burghwallis and Camp-  
sall—it is thought to breed here, but this is not a well authen-  
ticated fact.—M.
- Corvus cornix* . . . . . (Hooded Crow.) Rare.
- Nucifraga caryocatactes* . . (Nutcracker.) Campsall—rare.
- Picus major* . . . . (Greater Spotted Wood- } Occasionally seen—M.  
pecker.)
- *viridis* . . . . . (Green Woodpecker.) Rare.
- Coracias garrula* . . . . (Garrulous Roller.) { Two shot near Askern  
—M.
- Charadrius pluvialis* . . . . (Golden Plover.) Rather common.

\* See Naturalist, Vol. I., p. 33. † Naturalist, Vol. II., p. 357.

‡ Naturalist, Vol. I., p. 341.

<i>Ardea cinerea</i> .....(Common Heron.)	Askern—scarce.
<i>Totanus Ochropus</i> ....(Green Sandpiper.)	Campsall—rare—M.
<i>Scolopax major</i> (Solitary or Great Snipe.)	Sutton common—M.
<i>Cygnus ferus</i> .....(Whistling Swan.)	Campsall Lake.
<i>Spathulea clypeata</i> ..(Common Shoveller.)	Askern Pool—M.
<i>Podiceps cristatus</i> .....(Crested Grebe.)	Askern—rare.
<i>Colymbus arcticus</i> (Black-throated Diver.)	{ Two shot on Askern Pool—M.
<i>Anser segetum</i> .....(Bean Goose.)	Askern—scarce.
<i>Querquedula crecca</i> ....(Common Teal.)	Ditto--not uncommon.
<i>Mareca penelope</i> .....(Wigeon.)	Ditto—not ditto.
<i>Podiceps minor</i> .....(Little Grebe.)	Ditto—rare.

Of the MAMMALIA we have here no peculiar distribution. The collections of animals nailed as trophies on barns and other outhouses, furnish abundant evidence of the existence of such vermin, as the Pole-cat, Weasel, and Stoat: I have seen a specimen of what I believe to be the genuine Wild Cat; but many are so called, which are nothing more than the Domestic Cat, broken loose from restraint, and roaming about for prey.

The Fox being encouraged for the purpose of hunting, is frequently met with; twelve cubs were reared, in Campsall Park alone, the winter before last, and many find shelter in the woods at Smeaton Crag. The Hare and Rabbit abound in and near the adjoining preserves. The Mole is very common in spite of the vigilance of its destroyers. The Urchin or Hedge Hog is often observed in the woods and fields. Of the Bats, I have seen but the long-eared Bat, and the Noctule; a nest of nine

of the latter species was taken from an old tree at Sutton. The Squirrel at one time lived, in great numbers, on the Beech-trees at Campsall, but it is now seldom if ever seen there ; it is, however, very abundant at Smeaton. The common species of the Shrews and Mice are plentiful, as also the Brown Rat, and water Campagnol. The Stag or Red Deer, in its wild state, has long since disappeared ; but, its remains in the peat and gravel attest its former existence here.



## CHAPTER IV.

## HISTORY AND ANALYSIS OF THE MINERAL WATER.

## SECTION I.

## HISTORY OF THE SPA.

WE have no authentic account of the time when the water of Askern was first used medicinally ; but it probably possessed a local reputation long before it became an object of interest to strangers. One of the earliest writers upon this water was Dr. Short, of Sheffield, who published in 1734, “ *A Natural, Experimental, and Medicinal History of the Mineral Waters of Derbyshire, Lincolnshire, and Yorkshire.*”

The following is the Doctor’s account of the water :—

“ We meet with one of much greater note at *Askeron*, five miles from *Doncaster*, in Campsel parish, seven miles from *Pontefract*. It is exceeding clear water : it has a fine stone basin, and is

inclosed by a round walk. Its stream is full of white thick sludge, which ropes like a decoction of *Althæa*. It smells and tastes very strong of sulphur: it curdles soap and milk; turns silver black, brass a blue copper colour. It retained its *sulphur* smell to a third degree of heat. It becomes muddy and curdles in boiling. It is a very diuretic light water. The farmers find it of notable service to them in curing chafed feet, saddle galling, horses or oxen galled in the yoke, or by loading, &c., mangy dogs, scabbed horses, &c. It has done some notable cures in inveterate strumous, and other ulcers, scab, leprosy, &c. It's muddy white, with solution of silver; a clear sky blue, with tincture of verdigrease; light yellow, with tincture of rhubarb; it's first white, and then curdles, and lets fall a large brownish sediment with sugar of lead; with oil of tartar and spirit of hartshorn, it is whitish, curdles, and lets fall much sediment. It makes a strong ebullition with the acid spirits; with tincture of logwood a beautiful deep red; with tincture of galls, a muddy white. Five quarts of it exhaled, left three drams of white sparkling sediment, a dram whereof was a fine salt, which crackled on a hot iron; turned syrup of violets, green; fermented little with the acid spirits, but struck the nose with a pungent smell. The rest of the salt dissolved and set to crystallize, projected very fine crystals of nitre and marine salt; the last was the

largest. The sediment here is to the water, as 1 to  $426\frac{2}{3}$ ; the earth to the salt as 2 to 1."

"This *Spae* is within a few yards of *Askeron* Pool side, the water whereof is very hard, curdles soap into hard flakes, yet bleeches exceeding fine, stinks in summer, abounds with pike, perch, &c. It has several profound pits in it, the depth whereof are not known. It is constantly supplied with water from these pits; never is less in the greatest drought, nor overflows in the greatest rain, except the mill dam below is stopt with sludge and grass. The soil on one side is all lime-stone; on the other side a white clay, half a foot deep; and below that a very fine white sand."

The next writer who mentioned the Askern water, was Pennant, the celebrated naturalist, who published a *Tour through England*, in 1771. At this early period, Askern seems to have undergone those vicissitudes, which it is the lot of all watering places more or less to experience; for the "fine stone basin," with its "enclosed walk," mentioned by the worthy Dr. Short, were gone, and had become, says Pennant, "an irregular puddle, chiefly used for the washing of mangy dogs and pigs."

So long as the basin remained, the water was perhaps not used externally; but, after its destruction, a facility was afforded for washing animals, and hence probably originated the trial of this water as a bath for the human body. Baths were at first

supplied by a cottager, who carried the water from the spring to his own dwelling.

In 1786, another spring was opened which, for many years retained the name of the Old Bath; over this a straw shed was erected for the convenience of bathers; notwithstanding the absence of other than this very rude accommodation, the reputation of Askern increased, and in the year 1794, the then Lords of the Manor, Viscount Galway, and Humphrey Osbaldeston, Esq., erected a neat stone building, on the site of the original well, that once possessed the "fine stone basin."

Previous to this time, Dr. Chorley, of Doncaster, and Mr. Hindle, surgeon of Norton, had in various instances witnessed the beneficial effect of these waters, and were in the habit of advising both their internal and external use. As the place became resorted to, a new suite of Baths were erected in 1815, by the Lords of the Manor, at an expense of about £1000; this building occupied the place of the former one, and was for many years the principal bathing establishment.

Up to this time, there was no other recorded analysis of these waters, than the exceedingly imperfect one of Dr. Short, which was insufficient to give any correct idea of their properties. The desirableness of a new analysis becoming every day more apparent, it was at last undertaken by Mr. Le Gay Brewerton, surgeon, of Bawtry. From

the distance at which this gentleman resided from Askern, and extensively occupied, as he is known to have been, by his professional pursuits nearer home, it is a matter for surprise that he could produce a work so accurate in its scientific details, and so excellent in its medical instructions, as his *Treatise on the Mineral Waters of Askern*. His experiments were commenced in 1810, and continued at intervals till 1817, when he published his *Treatise*; this work contains the whole of Mr. Brewerton's chemical experiments, which present, perhaps, as close an approach to correctness as could have been attained at that time. The reader need only compare the results of Mr. Brewerton's analysis with those of Dr. Short, to see the great progress that had been made in chemical science in the course of 70 or 80 years; but the review of a shorter period than this would suffice to shew how much we are indebted to the labours of Bergman and Murray, for the accuracy that exists at the present day in this department of science. The circulation of this book amongst medical men and the wealthier classes of the community, seems to have had the effect of directing more attention to Askern; and since its publication, nearly all the buildings have been erected, and the aspect of the place has been quite changed.

In 1821, Mr. Murray, a Lecturer on Chemistry, published an analysis of these waters in the

*Doncaster Gazette*, which was afterwards reprinted for circulation.

Amongst Mr. Brewerton's MMS., intended for a second edition of his Treatise, which have been kindly furnished me by his successor, Dr. Nicholson, of Bawtry, I find some remarks condemning, I think justly, the summary manner in which Mr. Murray had come to his conclusions, which are, in some points, widely different from those which were the result of his own more carefully conducted experiments.

Since that time no other analysis has appeared, and the only other work I know of that has been written upon Askern, is a little volume published at Doncaster, called the "Askern Visitor's Guide."

In 1828, the Old and Manor Baths were taken down, and the Old Well and Manor Well were thrown into one, the former appearing to be only the outpourings of the latter; the Baths and Pump-room of the present elegant and commodious establishment are supplied from the original spring.

After the erection of the Hotels, and other improvements had taken place, several Wells were successively opened, from six of which the mineral water is now obtained.

## SECTION II.

## CHEMICAL ANALYSIS.

THE chemical analysis was chiefly conducted at the springs, and care was taken to prevent error by a repetition of all the experiments. Although the conclusions arrived at differ, in many respects, from those of previous analyses of these waters, I have yet great confidence in the general correctness of the results of the present investigation ; I have the less hesitation in making this statement, from having obtained the assistance of Mr. West, of Leeds, whose accuracy in the examination of other mineral waters, and whose reputation as an analytical chemist, are the best guarantees that I can give to the public.

In commencing the series of experiments, the water of six wells was submitted to the action of the chemical tests ; as their effects on each were so nearly similar, it was thought unnecessary to pursue the analysis so far as to ascertain in every case, the exact proportion of the substances present. Neither do I think it requisite here to enter into the minuter details of the analysis, nor to give an explanation in every instance, of the processes of

reasoning by which the conclusions stated have been arrived at. Analytical chemistry is, in fact, a department of science, involving all the great principles of Chemistry; and to render such details intelligible to the general reader, would occupy a far greater portion of this volume than would be desirable: I would refer those who wish for information on this subject, to the excellent epitome of Dr. Thomson, in the article on *Mineral Waters*, in the *Cyclopædia of Practical Medicine*.

The *smell* of the water from all the springs resembles that of the rinsings of a gun-barrel, or of putrid eggs, indicating at once the nature of the gas to which it is indebted for one of its most remarkable properties; this odour varies in intensity at the different wells.

When taken from the spring the water is bright and clear, but it is frequently a little coloured or turbid from the pump; this appearance arises from some water having remained in the pipes, and is not seen after a few strokes of the pump.

On allowing the water to stand for only a short time, a degree of milkiness is observed in it, and a slight film collects on its surface; if it stand for several hours, the cloudiness increases, and a precipitate which is composed of Sulphate and Carbonate of Lime, and traces of Sulphur falls to the bottom of the vessel. On account of the decomposition which thus takes place, the water loses its



smell by standing in open vessels; this occurs, although more slowly, even in corked bottles.

The *taste* of the water from the various springs differs but little; the sulphureous character is strongest at the Madder Close Well. Their temperature is not higher than that of the springs in the neighbourhood, which may be stated to average about  $49^{\circ}$  in this latitude; they therefore come under the class of *cold* mineral springs.

On bringing the water in contact with substances containing lead and silver, it quickly discolours them; on this account, the white paint, which contains carbonate of lead, is discoloured by the exhalation of gas from the water, and silver utensils and coins become brown by being dipped into it; these effects indicate the existence of the Sulphuretted Hydrogen, or Hydro-sulphuric Acid Gas, which distinguishes these waters.

The specific gravity was ascertained by means of an accurately closed phial, which contained when filled, exactly 1,000 grains of distilled water; the weight of the bottle, therefore, when filled with the mineral water, gave its specific gravity.

The following were found to be the specific gravities of the various waters, distilled water being 1,000 :—

- No. 1. Manor Baths' Well, 1,003.
- No. 2. Terrace Baths' Well, 1,002.4.
- No. 3. Charity Baths' Well, 1,002.
- No. 4. Parade Baths' Well, 1,001.5.
- No. 5. Madder Close Well, 1,001.7.

It will be right to state here that, from the want of proper care in lining the wells, water from other sources is allowed to mix with the Spa-water; this circumstance, to which the proprietors of the Baths ought to direct their attention, was, of course, to some extent, a source of error in making the sub-joined analysis.

The following is a statement of the effects of various tests on the waters :—

On adding chloride of sodium, an abundant white precipitate took place, indicating the presence of sulphuric acid in a state of combination.

After the expulsion of the gases by boiling, and the addition of an acid solution of acetate of lead, the waters yielded a precipitate, which also indicated the presence of a considerable proportion of sulphates.

By the addition of acetate of lead, and nitrate of silver, before the water had stood or been boiled, a copious brown precipitate was furnished, which rendered the presence of sulphuretted hydrogen evident, a fact which the smell, &c., had previously indicated.

On applying lime water, a precipitate, varying much in quantity, was given in every instance; the presence of carbonic acid or of carbonates was thus shewn.

On applying litmus which had been slightly reddened by an acid, the blue colour was again

restored, and thus attested the presence of earthy or alkaline carbonates. Carbonate of lime was indicated by the formation of a film on the surface of the water when heated.

Tincture of soap emulsified the water very much; this effect shewed the presence of earthy salts in large proportion.

The precipitates with oxalate of ammonia were abundant, and indicated the existence of a large quantity of lime in combination.

On the addition of phosphate of soda, after carbonate of ammonia, a precipitate was afforded shewing the presence of magnesia.

The existence of Iodine and Bromine in several mineral waters has lately been demonstrated; in many instances their quantity is so very small as to render it improbable that they can exert much influence on the human body. Within the last twelve months, however, Mr. West, of Leeds, has detected, in a mineral water at Woodhall, in Lincolnshire, upwards of half a grain of Iodine in the imperial gallon, a quantity which would undoubtedly act upon the system, if the water were taken in the doses ordinarily prescribed at watering places. The above quantity of water from the same spring contains eight grains of Bromine, an agent possessing similar medicinal properties to Iodine.

To ascertain whether these substances were present, the water was concentrated to a very high

degree by boiling; on the application of starch with the addition of chlorine water and sulphuric acid, no indication of the presence of Iodine was given. Chloride of palladium was also used, but, with the same result.

In trying for bromine, chlorine was added to the concentrated water, and the mixture shaken with ether; the ethereal solution was poured off, and a small quantity of potassa added; the ether was evaporated and the solution of starch applied; no colour was imparted either to the ether, or to the starch, to render the presence of bromine evident.

By the above processes it was satisfactorily demonstrated that the waters contained

Sulphuric Acid,		Magnesium,
Chlorine,		Sodium,
Carbonic Acid,		Sulphuretted Hydrogen,
Calcium,		

Which, in combination, form the following salts:—

Sulphate of Soda,		Carbonate of Lime,
Sulphate of Magnesia,		Carbonate of Soda.
Chloride of Calcium,		

These results are obtained by making the calculations of the constituents, on the principle laid down by Dr. Murray, namely, that the acids unite with the bases to form the most soluble salts; thus, according to Dr. Murray, if we have a water containing

Sulphuric Acid, 5,		Lime, 3.5,
Hydrochloric Acid, 4.625,		Soda, 4,

The sulphuric acid would unite with the soda, forming sulphate of soda, and the hydrochloric acid with the lime, forming chloride of calcium (or hydrochlorate of lime), which would be the most soluble salts: if, however, a mixture of this kind be evaporated, a double decomposition takes place, and sulphate of lime, and chloride of sodium are formed, constituting the least soluble combinations of the elements. This is precisely what takes place here; if any of the water be evaporated, a precipitate is thrown down, which consists of salts differing from those of the water in its natural state; this is an explanation of the errors that are committed by confining the examination to the salts that are formed during evaporation, and will also account for the differences that will be observed between the results of the present and former analyses of these waters.

In order to ascertain the proportions in which the above substances were present, the following processes were employed. The sulphuric acid was precipitated by means of chloride of barium in excess, nitric acid being added to prevent the formation of carbonate of barytes; on washing and drying the precipitated sulphate of barytes, its weight was ascertained, and the quantity of sulphuric acid thus became known. The combined chlorine was then separated by means of nitrate of silver. The lime was thrown down by oxalate of ammonia;

the precipitate was heated, and the quantity of lime inferred from the amount of carbonate of lime left after heating the oxalate. The proportion of magnesia was discovered, by separating it in the form of phosphate of ammonia and magnesia, by the addition successively of bi-carbonate of ammonia and phosphate of soda, and heating the precipitate to redness, after cautious washing. The remainder of the saline matter was ascertained to be carbonate of soda.

These processes gave the amount of solid ingredients as follows :—

	Manor Well.	Charity Well.
Sulphate of Magnesia.....	34 grains.	18 grains.
Chloride of Calcium .....	3 ....	4 ....
Sulphate of Lime .....	110 ....	104 ....
Carbonate of Lime .....	6 ....	12 ....
Carbonate of Soda .....	26 ....	26 ....
	179	164

The solid ingredients of the other springs, viz., the Terrace, South Parade, and Madder Close Wells, having a composition nearly similar to that of the Charity Well, it has not been thought necessary to introduce the result of their analysis, although each was carefully examined. The quantity of saline matter found in the Terrace Well was 144 grains, in the South Parade Well 140 grains, and in the Madder Close Well 100 grains.

On attempting to separate the salts from the water by evaporation, they react on each other, and

carbonate of lime, chloride of sodium, and sulphate of soda are amongst the precipitated salts.

In order to ascertain the nature of the gaseous constituents, a known quantity of water was placed in a flask, and the gas was expelled by long boiling under the flame of a spirit lamp. The gas was collected over water, and received into a narrow graduated glass vessel. The following were the results, calculated for the imperial gallon and the wine pint.\*

	Imp. Gall.	Wine Pint.
1. Manor Bath Well .....	21 $\frac{1}{4}$	2.213
2. Terrace Bath Well .....	35	3.646
3. Charity Bath Well .....	26 $\frac{1}{2}$	2.75
4. South Parade Bath Well.....	25	2.603
5. Madder Close Well.....	38	3.957

The quantity of sulphuretted hydrogen was ascertained, by exposing the gas, for a short time, in a narrow tube, to a solution of acetate of lead; the amount of absorption indicated the quantity of this constituent, the proportion of which in the several springs, was as follows:—

	Imp. Gal.	Wine Pint.
1. Manor Bath Well, ..... Inches.	8	830
2. Terrace Bath Well .....	8 $\frac{1}{4}$	859
3. Charity Bath Well .....	6 $\frac{1}{2}$	677
4. South Parade Bath Well.....	6	625
5. Madder Close Bath Well.....	14	1.458

\* The wine pint is here introduced, at the suggestion of Mr. West, for the purpose of affording an easy comparison of these results, with those from other wells, as given by Dr. Granville, who adopts this measure in his work on the mineral waters of Britain.

The remaining gas was agitated with a solution of potassa, and the amount of further absorption gave the following proportions of carbonic acid :—

	Imp. Gal.	Wine Pint.
1. Manor Bath Well, . . . . . Inches.	5 $\frac{1}{4}$	547
2. Terrace Bath Well . . . . .	14 $\frac{3}{4}$	1.536
3. Charity Bath Well . . . . .	8 $\frac{3}{4}$	901
4. South Parade Bath Well . . . . .	8	830
5. Madder Close Bath Well . . . . .	13	1.354

The unabsorbed portion might still contain hydrogen, carburetted hydrogen, oxygen, or nitrogen. After adding various proportions of oxygen to the gas, and on passing through it the electric spark, no explosion took place; a proof that no appreciable quantity of hydrogen, or carburetted hydrogen, was present. On adding hydrogen and oxygen, and on exploding them, the diminution of gas was not more than equal to that which had been introduced, and was thus indicative of the absence of oxygen in the water. The unabsorbed portion was, therefore, nitrogen, of which there were the following quantities :—

	Imp. Gal.	Wine Pint,
1. Manor Bath Well . . . . . Inches.	8	83
2. Terrace Bath Well . . . . .	12	1.26
3. Charity Bath Well . . . . .	11 $\frac{1}{4}$	1.171
4. South Parade Bath Well . . . . .	11	1.145
5. Madder Close Bath Well . . . . .	11	1.145

These results are somewhat different from those obtained by former analysts; but, it must be borne in mind that all previous examinations had been



entirely confined to the Manor Bath Wells. The analysis of Dr. Short was made when chemistry was little understood, and the nomenclature of that period renders it a difficult matter to ascertain the precise nature of the ingredients he alluded to. It appears that all waters exhibiting prismatic crystals like those of sulphate of magnesia, were supposed to possess nitre. By the term "marine salt" was probably understood the chloride of sodium or common salt, and that this substance was intended by Dr. Short, seems to be proved by the language of Elliott, who published a work on mineral waters in 1789, and who, in speaking of this water, says that each gallon "contains 48 grains of vitriolated magnesia, with a little sea-salt and a drachm and a half of earth." This statement was probably copied from Dr. Short's work, and gave to his expressions the correct explanation.

The next analyst of these waters was Mr. Brewerton, of Bawtry; his experiments were conducted with great care, and a full detail of them was published in his work. In arriving at his conclusions he did not adopt the principle laid down by Dr. Murray, but estimated the contents of the spring from the salts that were left after evaporation. The principle of Dr. Murray was at that time new, and had to contend with the opposition of those who had made their calculations from the dried contents of waters; and it was only in accordance with re-

ceived opinions that Mr. Brewerton pursued the old mode of analysis.

By a reference to Mr. Brewerton's book it will be seen that many of his experiments gave varying results, so much so that his final statements can only be looked upon, as they avowedly were by himself, in the light of approximations to the truth. The following is the result of his analysis:—

Gaseous ingredients in four wine pints of Askeru water.

	Cubic Inches.
Sulphuretted Hydrogen.....	3.33
Carbonic Acid .....	2
Oxygen .....	13
Nitrogen.....	1.53
	<hr/>
	6.99
	<hr/>

Salts, &c., in four wine pints:—

Sulphate of Lime.....	36.66
Sulphate of Magnesia.....	4.5
Carbonate of Lime .....	13.16
Carbonate of Alumina.....	43
Muriate of Lime .....	19
Muriate of Magnesia .....	1.45
Fetid resin of Sulphur.....	1.35
	<hr/>
	57.74
	<hr/>

The existence of soda, and the absence of alumina, as shewn in our late analysis, constitute the greatest difference between this and former ones. The "fetid resin of sulphur," mentioned by Mr. Brewer-

ton, appears to have been organic matter to which I shall allude when speaking of the origin of the ingredients of these springs.

The next published analysis was that of Mr. Murray, a Lecturer on Chemistry, who took the opportunity of a short stay at Askern to examine the waters; the results of his analysis appeared in a July number of the *Doncaster Gazette*, for the year 1821. Mr. Murray's examination was, however, made in too great haste for much reliance to be placed on his conclusions, some of which are, in fact, inconsistent with his own experiments. The following is the result of Mr. Murray's analysis:—

Saline contents of six ounces of water:—

	Grains.
Alum .....	0.25
Muriate of Soda and Magnesia.....	0.50
Carbonate of Lime.....	4.25
Loss .....	0.25
	<hr/>
	5.25
	<hr/>

Gaseous contents:—

Sulphuretted Hydrogen.

Sulphuretted Azote.

Atmospheric Air.

The presence of sulphuretted hydrogen is undoubted, but the existence of sulphuretted azote is certainly not proved by the experiments of Mr. Murray; and it may be fairly questioned whether the compound of sulphur and nitrogen, which has recently been obtained by Souberain, and which had

not been procured in a separate form when Mr. Murray wrote, can exist in a state of solution in a mineral water.

The large quantity of Carbonate of Lime is not to be found, as here stated ; if such were the case, the so called petrifying power of the water would far exceed that of any spring of the kind known in this country. The presence of Alumina was not, as I have noted above, in any way confirmed by our recent analysis. Oxygen, as a constituent of atmospheric air, was, by Mr. Murray, supposed to be present: it was not discovered by our more careful investigation. This gas is found constantly in waters exposed to the atmosphere, but appears to be very rare in mineral springs containing sulphuretted hydrogen and carbonic acid. The absence of carbonic acid in Mr. Murray's analysis is accounted for by his supposing that the carbonate of lime exists in the state of a super-salt; but, as the super or bi-carbonate of lime is not recognised as a salt by modern chemists, the carbonic acid has been considered in the present analysis as free. That there is more carbonic acid than would merely form a super salt with the carbonate of lime is proved by the existence of the same quantity of carbonate of lime, with unequal proportions of carbonic acid, in the various wells.

## SECTION III.

ON THE ORIGIN OF THE MINERAL WATER OF  
ASKERN AND ITS CONTENTS.

THE source of sulphureous waters has always been a subject of considerable interest, as they present so great a departure from the ordinary constitution of the waters of the earth, and retain, through such lengthened periods of time, the same character.

The origin of the innumerable springs with which the earth abounds has been variously explained; some have referred it to the great reservoir, the ocean, supposing that the water finds its way from thence through the clefts and fissures of the strata of the earth. According to this theory, the great difference in composition between the various mineral waters and that of the ocean has been thought to arise from the sea-water becoming altered by percolating through sand, and by passing over other ingredients; this explanation may apply to springs situated near the sea side, but is quite inadequate to account for the origin and existence of those in the interior of continents, and on the summits of mountains at vast distances from the ocean.

Another cause that has been assigned is the existence of water, in a state of vapour, in the central parts of the earth, the result of volcanic action; in this form it comes forth, as from the Geysers of Iceland; in that of boiling water, or water of various degrees of heat, as in thermal springs; or in that of water cooled down to the ordinary temperature of the earth. This was the theory of Scrope, and is probably correct with regard to the cause of the appearance of the water in most springs. From a geological examination of the district, it is very evident that volcanic agency has once been actively at work on the whole country around Askern; and it is probable that to such a cause we are indebted for its springs. But the great source of the water is undoubtedly the atmosphere, from whence it is precipitated in the form of rain and dew, which, after sinking to great depths, is brought up by the agency referred to above.

The source of the ingredients contained in the water must, however, be looked for in the nature of the rocks and strata through which the water passes in its course to the surface.

As the gaseous contents of the Askern water are the most prominent, the origin of these will be first discussed.

*Sulphuretted Hydrogen.*—A variety of theories have been proposed to account for its appearance, some of which have been very discordant and

contradictory. Two explanations have, however, been generally received, and, as each is adequate for the purpose, and is in accordance with known laws, I shall endeavour to point out their application to the springs in question, especially as the subject has lately obtained peculiar interest, from the discovery of the fact of large quantities of this gas being contained in the water of the ocean.

The situation of sulphureous waters, especially those of this country, near boggy districts, gave rise, at a very early period, to the opinion that the sulphuretted hydrogen was developed from vegetable matter: this explanation of its origin has been adopted by writers on the waters of Harrogate. The fact of sulphureous springs being found in abundance in the contiguous bogs, led to the supposition that all the wells were derived from this source, and the inhabitants of that place generally entertain a notion that "the bog is the mother of the waters." The elevated position of the swampy ground also favored this view; it was surmised that the waters were formed there, and that, after filtering through the rock, they appeared in their pure state at the lower wells.

The situation of Askern in the vicinity of boggy ground has also led to the same supposition with regard to the origin of its sulphureous waters. On making an examination of the boggy district, for the purpose, if possible, of gaining evidence for the

support of this conjecture, I found in many places, to the extent of some miles, the soil and mud of ditches impregnated with sulphuretted hydrogen : on further examination, it appeared that this gas was only in those localities through which the water of the Askern pool passed, which contains nearly the same solid ingredients as that of the wells ; and as no sulphuretted hydrogen was discoverable where other waters flowed, it was a necessary conclusion that there was something in this capable of producing the gas : it possesses a large quantity of sulphate of lime or gypsum, which contains the sulphur necessary to the formation of sulphuretted hydrogen. The action of organic matter on alkaline and earthy sulphates, was long ago pointed out, as a source of sulphuretted hydrogen, by M. Henry, of Paris ; and Brongniart supposes that the sulphureous waters of Enghien, near Paris, owe their origin to the same action. Dr. Hunter, in his work on the waters of Harrogate, after referring to other theories, thinks it most probable that the sulphuretted hydrogen exists from the contact of the water with beds of vegetable matter, and, as a proof that such may be the case, refers to the fact that those waters at Harrogate which have the largest proportion of this gas, contain the least proportion of the sulphates.

Mr. Brewerton also, in his book on Askern, has the following remarks :—“ It must be owned our



present chemical knowledge will not satisfactorily explain in what manner the water obtains its sulphuretted hydrogen, though its elements exist in gypsum and water, but its not being explicable, is no argument against its being possible. Perhaps some substances may present themselves in the course of the water, which assist in destroying the balance of affinities among the elements of the gypsum, and this circumstance may be only of partial occurrence, or may require a great length of time; otherwise, one would expect to find that all water arising from a bed of clay and gypsum would be sulphureous, which is not the case."

In order to ascertain if vegetable matter in contact with the sulphates, would produce sulphuretted hydrogen, I had recourse to direct experiment, and submitted portions of bog soil to the action of various sulphates; but, failed in obtaining any of this gas. I then mixed various vegetable matters in a decaying state, with solutions of the sulphates of lime, soda, magnesia, and iron, and, with the three first, obtained evidence of the existence of a large quantity of sulphuretted hydrogen; the magnesia was the first to show the existence of the gas, but the lime gave it out in the largest proportion; the soda afforded the least evidence of its presence, and the iron gave no indication of having undergone any change. There was also evidently disengaged, in all the experiments, a quantity of carburetted hydrogen.

The following theory is offered as an explanation of the changes that take place in these solutions. When vegetable matter is added to an alkaline sulphate in solution, the carbon which it contains unites with a portion of the oxygen of both the water and the sulphuric acid, forming carbonic acid, and a sulphuret of the metal is formed; the carbonic acid being in contact with the sulphuret and the water, decomposes them; the result is, the formation of a carbonate of the oxide of the metal, and sulphuretted hydrogen, with carbonic acid, is set free.

Whilst I was thus endeavouring to account for the presence of sulphuretted hydrogen in so large a district of the Vale of York, Professor Daniell, of London, was engaged in investigating the cause of the existence of the same gas in sea-water from the coast of Africa. From experiments precisely similar to those I have related, Professor Daniell came to the conclusion, that the sulphuretted hydrogen, which he found in the specimens of sea-water brought from Africa, was produced there by vegetable matters, carried from the great rivers, coming in contact with the sulphates which the sea-water contains. The quantity of sulphuretted hydrogen generated in this water is truly astonishing, some portions having been found to contain more of this gas than our strongest sulphureous springs. That such a quantity should have existed

so long without observation is still more surprising, and I am inclined to think, although in opposition to the conclusion of so distinguished a chemist as Professor Daniell,\* that the larger proportion of the sulphuretted hydrogen was formed in the specimens of water he examined, after they had been taken from the sea, and during their voyage to this country; and for these reasons:—

1. In my own experiments the solutions gave much stronger indications of sulphuretted hydrogen when placed in corked bottles than when in open jars.

2. Some sea-water taken near the coast of North and South Wales, which was examined by Dr. Clem, a German chemist, contained so large a quantity of this gas as to smell and taste like a strong sulphureous water. It cannot be supposed that this is really the state of the water off the Welsh coast, and it is only reasonable to conclude that the gas was developed after it was enclosed in bottles.

3. A very small portion of carbonaceous matter would suffice to produce a large quantity of sulphuretted hydrogen: a grain of carbon, according to the theory before given, would liberate nine cubic inches; therefore, the fact of but a small quantity of

\* See his paper, on the spontaneous evolution of Sulphuretted Hydrogen, in the waters of the western coast of Africa, and other localities, in the *Philosophical Magazine* for July, 1841.

vegetable matter having been found does not prove that the sulphuretted hydrogen existed previous to the water being bottled; there was probably originally more than enough to produce the sulphuretted hydrogen it possessed.

4. The large quantity of sulphuretted hydrogen, found by Professor Daniell, would be entirely destructive of both animal and vegetable life; but the seas off the coast of Africa, far from being destitute in these respects, appear to be very prolific.

However satisfactorily the sulphuretted hydrogen that occurs in small quantities may be accounted for by the above theory, we must seek for another explanation of the origin of that which is pumped forth, in prodigious quantities, from the craters of volcanoes.

Again, the possibility of the decomposition of sulphates giving rise to the sulphuretted hydrogen in so many mineral waters is very questionable; several sulphureous springs are met with on the sides of mountains formed of primitive rocks, and in positions where it would be difficult to imagine that vegetable matter exists either in a fit state, or in a sufficient quantity, to produce the constant supply of sulphuretted hydrogen to the water, from the decomposition of sulphates. In many of the underlying strata of Yorkshire, and other districts of this country, large quantities of iron pyrites, or sulphuret of iron, occur; and, it is the opinion of many

chemists, that water flowing through this material, is decomposed ; that a portion of its hydrogen unites with the sulphur of the sulphuret of iron, and that the gas thus formed is set free.

*Carbonic Acid and Nitrogen.*—The origin of the other gases, that are found in the waters of Askern, is not less interesting to the chemist and geologist than that of the sulphuretted hydrogen, although from the want of striking sensible properties, they have obtained less notice from writers on mineral springs. The carbonic acid forms a large portion of the gaseous contents of some of the springs, and gives to one or two of them their peculiar lively taste. Bischoff, a German writer, has advanced a theory of its formation which appears to be unobjectionable : he supposes that, in the lower strata of the earth, various carbonates are exposed to a heat sufficiently great to expel the carbonic acid, which being thus set free, is absorbed by the waters that are traversing the rocks in order to reach the surface. Those waters would have thus the most carbonic acid which are nearest the seat of any internal heat ; this is really the case with such as are found in the neighbourhood of volcanoes, and where the surface of the earth gives most decided evidence of volcanic action. Both with regard to this, and sulphuretted hydrogen gas, Professor Phillips has observed, that they occur in the neighbourhood of great faults in the strata ;

such is the case near Askern, Harrogate, and other mineral springs in this country. These faults are indications of previous volcanic action, and furnish speedy egress to the impregnated water.

The presence of the nitrogen is not so easily accounted for. Berzalius supposes that it may arise from the decomposition of organic matter containing nitrogen; but, the large and continued supply of it in some waters does not support this hypothesis. Anglada, an Italian chemist, believes that it arises from absorption of atmospheric air, which must be supposed to exist in the interior of the earth; that the nitrogen, under the high pressure, enters into combination with the water, and appears with it at the surface of the earth, the oxygen of the air being absorbed by various agents, as sulphur, &c.

*Salts.* However difficult it may be to account for the gaseous ingredients, it is not a more easy task to explain the existence of the solid constituents held in solution.

The water of springs having been originally pure, the question arises,—from whence did they derive their saline ingredients? It might be stated in reply, that the water, in passing through the strata of the earth, has dissolved the various salts it met with in its course; and, this would be a satisfactory answer, if we knew that there existed in the rocks through which the water passes, great

quantities of the substances dissolved. But this is not the case, and we are therefore obliged to have recourse to the supposition that they are formed by chemical agency. The solid ingredients of the Askern water are, sulphate of lime, carbonate of lime, carbonate of soda, sulphate of magnesia, and chloride of calcium; of these the carbonate and sulphate of lime alone exist as rocks, and this latter is only found amongst secondary and tertiary formations, as the product of chemical change; the remaining salts must, then, have been formed by chemical agency. To go further, however, into this interesting subject, would occupy more space than is consistent with my plan; and I must refer those who wish for ampler information, to works treating more especially of these questions. (See GAIRDNER, *on Mineral Springs*.)

*Organic Matter.* In various mineral waters substances have been found belonging to the organic kingdom, and have received designations according to their supposed nature. In the recent analysis I have not made any calculation of the amount of organic matter in the waters of Askern. By a reference to Mr. Brewerton's analysis it will be seen that he mentions the presence of a substance, undoubtedly organic, which he calls, after Westrumb, the *fetid resin of sulphur*; this, and other analogous substances have had considerable attention given them by continental chemists. I shall

endeavour to explain the nature of the matter alluded to.

If, at any time, the sides of the wells, or the pipes through which the sulphureous water is conveyed, or the bottoms of the cisterns, be examined, there will be seen adhering to them a white flocculent substance, which, in the course of a little time, changes its colour, and becomes grey, or blackish. If this, in the early period of its existence, be submitted to the microscope, it will be found to consist of a mass of single delicate fibres; but, as it increases in age, these fibres give rise to smaller ones, which surround them in verticilli, constituting the plant known by the name of *Conferranivea* (see page 56). As this substance grows rapidly, so it appears to decompose rapidly, and the water in which it is kept has frequently an oily-looking film, which, on being examined by the microscope, presents no traces of organization. Whilst this film is forming, the water gives off a gas of a nauseous odour, which, although sulphureous, has a different character from sulphuretted hydrogen. This decomposing matter has been described by continental chemists as *glairine*. Professor Anglada, who wrote largely on it, supposed it to be the result of chemical changes; he examined it at the sulphureous springs of the Pyrenees, and points out no less than seven forms in which he had found it to occur. During the



summer of 1840, I visited the sulphur springs of Edinburgh, Moffat, Gillesland, Middleton, and Croft, and in all I was enabled to detect the so-called *glairine* of Anglada, and saw it, I believe, in most of the forms mentioned by him. It existed in the greatest abundance at Moffat, where, the water flowing from a cavern in the rock, much more opportunity is given for the formation of this substance than at any of the other springs. In every instance I detected the *Conferva nivea* of Dillwyn, and, after an examination of this plant, in its various stages of growth, both in Edinburgh and London, I am convinced that it is the great source of the organic deposits in the sulphureous springs of this country; and, from Professor Anglada's description of *glairine*, in his work on the sulphureous waters of the Pyrenees, I believe it to be capable, during decomposition, of producing the various forms of that substance which he describes. Dr. Daubeny, who has paid much attention to this subject, is also decidedly of opinion that it is of vegetable origin. It must have been its peculiar smell that led Mr. Murray to suspect the presence of a compound of sulphur and nitrogen in the waters of Askern.

This substance, however, does not constitute the whole of the deposit around the sides of the sulphur wells; for, whilst evaporation, and the escape of carbonic acid gas from the water are con-

stantly taking place, the saline matter is deposited, in small quantities, upon the growing and decomposing organic matter, and can be discovered amongst it by its crystalline character. When it is collected in this state, and sulphuric acid is poured upon it, a powerful effervescence ensues; chloride of Barium indicates the presence of sulphates. On throwing it on the fire, it gives out a smell of sulphurous acid gas, an evidence of the presence of sulphur, which can be accounted for in two ways: in the first place, it appears to enter into the composition of the vegetable substance, and is probably the element that determines its existence and character, as it has never been found where sulphur is absent; in the second place, a small quantity of sulphur may be precipitated by the decomposition of the sulphuretted hydrogen, and fall down with the salts on the organic matter. Thus far, then, this substance, according to the state in which it is procured, may be composed of mineral and vegetable matters; but, many writers who have examined it, have supposed it to be of animal origin, and have called it *animal extractive*, *zoogene*, and *baregene*: that it may exhibit the character of an animal product, occasionally, I have no doubt, as I have invariably seen, on keeping it for a short time, that animalculæ are generated in it in very great abundance. I have before alluded to an animalcule which produces a rose-

coloured deposit, and which I have found with the vegetable and mineral ingredients at the bottom of the water. In the sulphur wells of Harrogate, the deposits on their sides may be seen to consist of almost regular layers of dark vegetable substance, then the red animalculæ, and over these the saline matter, and so on successively. This may perhaps account for the red colour which Anglada has observed glairine frequently assume. I also found a rose-coloured glairine at Moffat, depending on the existence of infusory animalcules; but these were of a much smaller size, and evidently of a different family from those found by me, in the Askeru and Harrogate waters.

The chemical examination of this substance proves that it contains sulphur, nitrogen, and carbon; these are sometimes active elements; but, whether they exist in this organic matter, in sufficient quantity to produce a decided effect, remains, I think, to be proved. If the glairine be developed, as I believe it to be, subsequently to the exposure of the water to the air, it can have no effect in the water; but, if it be held in solution, as maintained by Anglada, then it may have considerable influence on the remedial properties of the water.

## SECTION IV.

## HISTORY OF THE VARIOUS WELLS, AND COMPOSITION OF THEIR WATERS.

## NO. I. MANOR BATH WELLS.

There were formerly two wells, known by the names of the Old and the Manor Wells. The present suite of buildings was erected in 1828, by Humphrey Osbaldeston, Esquire; it consists of a centre, occupied by the baths, and of two wings, containing the Pump-room, and a commodious promenade room. The present proprietor and conductor is Mr. Ward.

The analysis of an imperial gallon of this water gave the following result:—

	Grains.
Chloride of Calcium .....	3
Sulphate of Magnesia .....	34
Sulphate of Lime .....	110
Carbonate of Lime .....	6
Carbonate of Soda .....	26
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> 179

	Cubic Inches.
Sulphuretted Hydrogen.....	8
Carbonic Acid .....	5½
Nitrogen or Azote .....	8
	<hr/>
	21½
	<hr/>

## NO. II. TERRACE BATH WELL.

The increase of the number of visitors, owing to the increasing celebrity of the old wells, induced individuals to make further search for Sulphur Springs, and, in 1823, this well was opened by Mr. Ives, and commodious Baths and a Pump-room were erected; they are now the property of Mr. Charles Saul. The spring, which abundantly supplies the well, issues from a deposit of the calcareous tufa, about five feet from the surface of the earth.

The solid and gaseous constituents of each imperial gallon are, of—

	Grains.
Chloride of Calcium .....	4
Sulphate of Magnesia .....	18
Sulphate of Lime.....	104
Carbonate of Lime .....	12
Carbonate of Soda .....	26
	<hr/>
	164
	<hr/>

	Cubic Inches.
Sulphuretted Hydrogen .....	8½
Carbonic Acid .....	14½
Nitrogen.....	12
	<hr/>
	35

## NO. III. CHARITY BATH WELL.

One of these wells, now used only internally, was opened in 1825, when the baths and pump-room were erected by the late Mr. Osbaldeston. The supply from it not having been found sufficient for the increasing demand upon the Bath Charity, two new wells have been more recently opened, from whence the water is derived which is used for bathing. The springs that supply these three wells all rise in the peat soil on the south-west side of the pool.

The solid contents are the same as those of the Terrace Bath Well; the quantity of gaseous ingredients is, of—

	Cubic Inches.
Sulphuretted Hydrogen .....	6½
Carbonic Acid .....	8¾
Nitrogen .....	11¼
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> 26½

The charitable institution above alluded to was founded in 1825, at the joint suggestion of Dr. Oxley, and of Mr. Raisin, of York, who at that period was visiting Askern for the benefit of his health. These gentlemen having accidentally met, and having discussed and determined upon the desirableness of such an establishment, an application was made to the late Viscount Galway, the Lord of the Manor, and his patronage secured. Subscriptions were afterwards obtained, and Mr. Keyworth, surgeon, of Askern, was appointed

Secretary : under his superintendence, and that of his successor, Dr. Oxley, the institution has attained its present flourishing state.

The Patroness of this Institution is Miss Brooke, of Gateforth; President, G. Cooke Yarborough, Esq.; Vice-President, the Incumbent of Campsall, Ex-Officio; Trustees, Lord Hawke, Lord Feversham, Sir W. B. Cooke, Bart., P. Davies Cooke, Esq., R. F. Wilson, Esq., Rev. E. Rudd; Treasurers, Sir W. B. Cooke, Bart. and Co.; Physician, Dr. Oxley; Secretary, Mr. I. F. Oxley. The following are the Rules:—

1. Every annual Subscriber of One Pound shall recommend three Patients in each Season, i. e. between May 1 and October 31. In like manner three Patients for every additional Pound. Such Subscriber may recommend more than three Patients for each Pound, provided they do not require the weekly allowance, and their bathing expenses do not exceed the amount of the Member's Subscription. Every Subscriber of Ten Shillings will be allowed to recommend one Patient.

2. Every past and future Donor of *Ten Pounds* shall have the privilege of recommending annually for life two Patients; every future Donor of Five Pounds shall be entitled to recommend two Patients in each year for five years; and every Donor of One Pound and under Five shall be entitled to recommend two Patients for every Donation of a Pound for that season.

3. Persons may be sent at the expense of their respective Parishes, and admitted at the rate of 1s. per week to the use of the Bath, such persons finding Board and Lodging and Medicine themselves, or at the expense of the Parishes to which they belong.

4. An occasional Contribution of Five Pounds and upwards constitutes a life Governor; and every annual Subscriber of One Pound is a Governor for the year of his subscription.

5. Every Subscriber recommending a Patient, shall address a letter to the Secretary, *if by post, post-paid, stating* the character of the Patient, *whether he is a proper object for the weekly allowance, or the Baths only,* and containing a Surgeon's certificate to the nature of the complaint.

6. Every Patient shall defray his own expenses to and from Askern, and support himself until he can receive the weekly allowance. All Patients receiving weekly allowance are required to reside at Askern.

7. Patients will in future be admitted to the Charity only upon Monday and Friday in each week, between the hours of Eleven and Five.

8. Patients conducting themselves in an intemperate or disorderly manner may be discharged from further use of the Bath of the Charity, and from further weekly allowance.

9. Every Patient so recommended shall have medical advice, medicines, and the use of the Baths gratuitously, together with an allowance of Four Shillings per week (if in need of such pecuniary aid) for three weeks, or longer, according as the Committee may determine.

10. The Patrons, President, Vice-President, Trustees, Governors, Secretary, Treasurer, Physician, and Surgeon, shall form a Committee, three of whom shall have the power to act; and the Committee shall meet on the first Thursday in every month during the season.

11. In any emergency, the Secretary may call a Special Meeting of the Committee.

12. The Annual Meeting shall be holden on the last Monday in July, to audit the Accounts, &c.

13. Subscriptions and Donations will be received by the Secretary and Treasurers. Annual Subscriptions due May 1st, to be paid in advance.

14. No proposition hereafter made at a Monthly or Special Meeting of the Committee, shall be admitted as a Rule until it be confirmed at the Annual Meeting.



## NO. IV. SOUTH PARADE BATHS.

The well that supplies these baths was opened by Mr. Coe in 1827. The spring issues from the peat soil, near the road, in Madder Close, and lies nearer the Magnesian limestone than any of the other springs; its depth from the surface of the earth is about five feet.

The solid constituents of this water are the same as those of the Charity Bath wells; the imperial gallon contains, of—

	Cubic Inches.
Sulphuretted Hydrogen.....	6
Carbonic Acid .....	8
Nitrogen.....	11
	<hr/>
	25
	<hr/>

## NO. V. MADDER CLOSE WELL.

A further supply of water being needed for the South Parade Baths, another spring was opened in Madder Close, in the summer of 1828; it is exceedingly abundant, affording not less than 5,000 gallons in an hour.

The solid constituents of this water are the same as that of the other wells, but are somewhat less in quantity. The proportion of gases in the imperial gallon is, of—

	Cubic Inches.
Sulphuretted Hydrogen.....	14
Carbonic Acid .....	13
Nitrogen .....	11
	<hr/>
	38

## CHAPTER V.

ON THE MEDICAL USES OF THE MINERAL  
WATER OF ASKERN.

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SECTION I.

## ON THE USE OF MINERAL WATERS IN GENERAL.

AMONGST the various agents that have been employed by man to prevent or cure disease, none, perhaps, have had a longer or more variable reputation than mineral waters. In the early period of the existence of our race, those objects were resorted to, as remedies for disease, which possessed the most striking physical properties, and were most easily obtained. In this two-fold character, mineral waters presented themselves, and according to their judicious or injudicious application, were their effects upon disease. Most of the early Greek and Roman writers refer to them as used in their time. Homer describes medicinal springs issuing from the banks

of the Scamander. Hippocrates has recorded some of their effects in disease. Aristotle has left a theory of their origin, and Horace speaks in praise of the waters of Baiae, which remain impregnated with sulphuretted hydrogen to the present day. By the Greeks and Romans they were thought worthy of consecration to their deities, and Hercules was made their tutelary divinity, a proof of strong belief in the invigorating powers of these remedies. But, in giving them a divinity, they erected a temple, and introduced a priesthood, who soon found means to impose upon the credulity of those who resorted to the waters for health. This led to their disuse when the Christian religion began to spread, as its disciples avoided, with horror, all those practices that were connected with the rites of heathen worship. The revival of their use amongst modern nations appears to have been commenced with Charlemagne, who fixed his residence at Aix la Chapelle, for the sake of drinking, and bathing in, its waters. The mineral springs of England that obtained the earliest reputation, were those of Bath, which appear to have been resorted to by both Romans and Saxons on their invasion of this country.

At the present day, the value of mineral waters is generally acknowledged, and they are consequently much resorted to both at home and abroad; a watering place is, however, not unfrequently a

fashionable rendezvous, and it is probable that those who seek amusement and relaxation, in a change of scene, at our mineral spas, equal in number those who are seeking health from the waters.

As, in the earlier periods of the history of mineral waters, their consignment to the care of priests became the means of leading to various impositions, and assigning to the waters properties which they could not possibly possess; so, at the present day, this tendency to overrate their powers exhibits itself amongst those who have an immediate interest in the recourse of the sick to these springs. Nor has this extravagance been confined to the interested alone, for many great names in medical science have sanctioned the belief of a potency in mineral waters, that accurate investigation will not confirm. Long lists of diseases are given, which had resisted almost every variety of medical treatment, and are reported to have been easily cured by the mineral water recommended, all mention of other circumstances that had doubtless conspired to this end, being carefully avoided. The dogmatism with which these statements have been made, and the evident unfairness of many of the conclusions, have, on the other hand, raised up a number of opponents. This is but the history of almost all the valuable medicines that have been added to our stock of curative means; their

discoverers or introducers, anxious to gain for their favourite remedies an immediate attention, seek only for proofs of their efficacy, and frequently publish those which are of a doubtful kind; the consequence is that they do not realize, in the practice of others, the statements of their advocates, and they become undeservedly neglected, or opposed. Thus has it been with mineral waters, and they have probably lost more of their reputation by their friends than by their foes.

It would not be consistent with the scope of this work, to enter into any lengthened defence of mineral waters in general. It is admitted on all hands that patients are cured of diseases by visiting mineral springs; but, what the opponents of their use object to, is, that persons persist in ascribing their restoration to the efficacy of the waters, instead of the altered circumstances by which the invalids are surrounded, and to which, they say, the cure should be attributed. It must be allowed that these circumstances are capable of producing very beneficial effects, but surely some proof should be given of their power alone to cure certain diseases, before the mineral waters are rejected as useless. The fact is, that a mineral water is frequently a powerful medicine, and when judiciously used is one of the many things that contribute to restore health.

## SECTION II.

ON THE CIRCUMSTANCES ATTENDING THE USE OF  
MINERAL WATERS.

IN order to estimate the real effects of a visit to a mineral spring upon an individual, all the circumstances influencing the condition both of mind and body, should be taken into consideration. For instance, where persons have lived in large towns, the life they lead at a watering place is a perfect contrast to that which they have led at home. Rising and going to bed early, regular meals, exercise, and pure air, are substituted for their contraries, and to these are frequently added an agreeable journey, entirely new scenes, and removal from a thousand injurious excitements. Persons suffering from disease in towns, whether amidst the luxurious ease and affluence of the rich, or the filth and wretchedness of the poor, will in vain expect relief from mineral waters or other medicines, which would probably restore them to health, were they placed in the above favourable circumstances. We have here, then, no argument against the use of

mineral waters, but one strongly in their favor. I will not enter upon the discussion as to whether artificial are as efficacious as natural mineral waters; many writers assert that they are not, and with much reason on their side, maintaining that chemistry may not yet have unfolded all the contents of natural mineral waters, and that it is impossible accurately to imitate their composition; at any rate, it is impossible to imitate their situation; and though some of them have not a fine climate and varied scenery, their particular locality may have a decided influence on the health.

The new external condition of persons visiting watering places deserve a few remarks: of these, an important one is

*Change of Air.*—Although the atmosphere is composed of the same principal constituents throughout the world, yet it is constantly exposed to great differences with regard to the watery vapour it contains, the gases that may be given off from any part of the surface of the earth, the heat and cold to which it may be subjected, and the agitation of wind. It frequently happens that a mere change of air is beneficial to health, entirely independent of its composition or character. Some are benefited by a removal from a dry to a humid atmosphere, from the air of the mountain to that of the valley, from the town to the country; the opposite changes are in other cases advisable. These cir-

cumstances modify materially the influence of watering places, and attention to them will always repay the valetudinarian. In the next place,

*Absence from Business &c.*, must always have a powerful influence on the health. The constant stretch of the mind, in one direction, is much more frequently the cause of disease than is suspected; and many persons with aches and ailments, to them apparently far removed from the operation of the mind, do not understand how they are to gain relief by change of pursuit. But, when it is considered how intimately the mind is connected with the nervous system, and how this system controls and influences every function of the body, we need not wonder at the fact of diseases of the body being cured by the relief given to the mind. To this may be traced the origin of many of the vaunted cures of quackery, as well as of much of the success of the judicious and enlightened practitioner. Give to the mind ease for anxiety, confidence for mistrust, and, in many instances, physic may be thrown to the dogs. The marvels wrought by invisible doses of medicine, magnetic tractors, or cold water, need no further explanation. The same action of the mind on the body will render new scenery, and new objects of attention, beneficial; and a sick person has often been known to become entirely well, before arriving at his journey's end.



Another element of cure, and one which is mostly secured by valetudinarians at watering places, is

*Exercise.*—This, although one of the most necessary conditions of health, is nevertheless often neglected, and particularly in our large towns. It is no uncommon thing for females of the higher and middle classes to keep within doors for days and weeks together, not having the advantages of the servants of their households, whose occupations generally secure them against inaction; others are obliged to forego exercise on account of sedentary employments. The want of exercise is detrimental to all, whatever may be their station in life, sex, or age: local congestions and nervous derangements are the result; which, from their reaction on the mind, frequently make the life miserable, and, if they do not lay the foundations of serious and fatal diseases, drive their victims eagerly to seek at a watering place, that relief which they have not known how to obtain at home: there they frequent the springs as an object of interest, and seek amusement for their leisure hours, and thus take that exercise, the neglect of which alone has, perhaps, produced their languid and disordered frames; the consequence is that a rapid improvement is soon visible.

These circumstances, and many others, should be taken into consideration, in endeavouring to

estimate the remedial efficacy of a mineral water: but, although some of them singly would effect a cure of many diseases, there can be little doubt in an unprejudiced mind, that the various saline and gaseous constituents of mineral waters have an influence on the health. Independent also of these ingredients, the ingestion of water, and the employment of it as a bath, are capable of effecting desirable changes in the system.

## SECTION III.

## ON BATHS AND BATHING.

PREVIOUS to speaking of the peculiarities of the Askern waters, I shall make a few remarks on the use of baths and bathing generally, which will be confined to those kinds of baths, and that use of them, which the establishments of Askern afford.

From the earliest times, the habit of immersing the body in water of various temperatures has prevailed amongst mankind: with some of the nations of antiquity, bathing has been enjoined as a religious rite; with others, it has constituted a chief luxury; whilst in all it appears to have been recognised as a powerful means both of restoring and preserving health. In modern times, it has comparatively fallen into disuse, and especially in our own country, where, perhaps, a greater amount of evil attends its neglect, as a means of preventing disease, than in any other; it is not, however, as an agent for preserving health that I must here speak of bathing, but rather as one for the recovery of it when lost.

In the application of water as a bath, it may be employed at almost any temperature; but, that

which is generally used, is between the 33rd and 112th degrees of Fahrenheit's thermometer. When the contact of the water with the body produces a sensation of cold, it is called a *cold bath*, and when that of heat, a *warm bath*: this, however, is an arbitrary division, and the line between cold and warm cannot very accurately be drawn; but we may, for the large majority of persons, place it between the 84th and 88th degrees. In order to divide the range of bathing temperature for practical purposes, Dr. Forbes, under the article "*Bathing*," in the *Cyclopædia of Practical Medicine*, proposes the following classification:—

1. The Cold Bath.....	from	33°	to	60°
2. The Cool Bath.....		60°	..	75°
3. The Temperate Bath .....		75°	..	85°
4. The Tepid Bath .....		85°	..	92°
5. The Warm Bath .....		92°	..	98°
6. The Hot Bath.....		98°	..	112°

1. *The Cold Bath*.—When a person enters water at a temperature of from 33 deg. to 60 deg., a feeling of cold is experienced, combined with a confused mental feeling, and a deep inspiration is taken; these symptoms, which are called the *shock*, and which vary in intenseness according to the degree of cold of the bath, are followed rapidly in those of sufficient vigour of constitution by a pleasurable sensation of warmth, an evidence of salutary reaction; the water no longer feels cold, and if the person come out of it in this state, and the body be

Immediately dried, the sensation of warmth continues, and is sometimes even succeeded by perspiration: should he remain in the bath an undue length of time, the feeling of cold would return, which would go on increasing, until numbness, and a loss of sensation, would be the consequence, and life at last be extinguished. Under the influence of the cold the skin turns pale, and the surface is diminished in bulk; the pulse becomes smaller and slower, and a sense of oppression is felt at the chest. These phenomena are the result of the action of the water on the nervous and circulating systems: the first shock arises from the impression of cold on the nerves of sense, combined with the sudden driving away of the blood from the surface to the central parts of the body. The reaction is produced by the stimulating effects of the blood on the heart and brain, by which their powers are, as it were, summoned to repel the enemy from without, and, in vigorous constitutions, these powers are always ready to obey the summons: the heart acts more rapidly, more animal heat is evolved, and thus the agreeable glow is kept up; but there are bounds to this reaction, which cannot be prolonged for an indefinite period.

Medicinally, the cold bath is had recourse to for the purpose of producing the state of reaction, and constitutes one of the most effective tonics that can be employed; in the use of it, care must always be

taken that the system is capable of instituting the stage of reaction ; with this precaution, it will be found an useful remedy in chronic diseases characterized by langour of the circulation, tendency to profuse perspiration, and various nervous symptoms, as tremors, head-ach, and erratic pains. Plethoric persons, and those liable to inflammatory affections of the lungs, congestion of the head, &c., should not be allowed to use the cold bath.

Nearly similar effects follow the use of cold water in the form of the shower bath, cold affusion, and the douche : as a preventive of catarrh, and many of the slight derangements of the health, which are often the beginnings, when neglected, of fatal disease, nothing is perhaps more effectual than the habitual use, through the whole year, of the shower bath or cold affusion.

The *Cold Bath* is not much used at Askern, but cases, in which it is applicable, may occur, where the sulphureous impregnation of the water would enhance, in some measure, the value of the remedy.

The *Cool* and the *Temperate* Baths should be used where it is desirable to produce only a small amount of the effects of the cold bath.

*The Warm Bath.*—On entering water at a temperature between 92 deg. and 98 deg., a feeling of pleasurable excitement is produced, which is the more agreeable in proportion as the body has been

previously exposed to cold: the functions of the skin are promoted, and experiment has proved that it takes up a considerable quantity of the water into the system, and that a certain amount of the fluids of the body pass out from it; the solids are relaxed and softened, and the action of the blood-vessels of the surface is stimulated, so that blood is drawn from the internal parts, and the circulation is thus equalised; the action of the heart is also increased in most cases, and the number of its pulsations is proportionate to the degree of heat of the bath.

The warm bath is a gentle excitant, and, on account of the large surface on which it acts, is a very valuable remedy; it is especially so in all those frequent cases which are attended with congestion of the mucous membranes of various organs; thus, in indigestion, dependent on an excited state of the vessels of the mucous membrane of the stomach and intestinal canal, likewise in affections of the same kind, of the bronchia, uterus, and urinary passages, it is productive of benefit; after bleeding, in most inflammatory diseases, it may be used with advantage, as also in many of the severer forms of neuralgic disease, and the derangements of the nervous system; in gout, unattended with plethora, and in chronic rheumatism, it is a remedy of considerable influence; from its immediate action on the skin, it is of great service in the numerous forms of

cutaneous disease; it affords great relief to the fatigue which is felt after excessive bodily exertion of any kind, or after travelling; in those states of the body, also, in which there is irregular distribution of the blood, lowness of spirits, and langour of the circulation, indicating a proclivity to disease, the use of the warm bath may be the means of preventing the invasion of serious maladies.

In gout, chronic rheumatism, and many varieties of skin disease, the addition of sulphuretted hydrogen to the bath renders it much more efficacious.

The time during which a person should be immersed must vary according to circumstances; the most usual time is from a quarter of an hour to twenty five minutes; this may, however, in many complaints, be prolonged with great advantage, and where persons do not suffer from contumance in the bath, it would be well to lengthen the period, until some decided effect is produced. In many of the watering places of Germany, Switzerland, and Italy, people are in the habit of spending several hours of the day in the warm bath, and with very beneficial results; no immediate danger is to be apprehended from this practice, and the only precaution necessary is, the keeping the water at a proper temperature.

The part of the day at which a bath is taken is often a matter of convenience, or even in some watering places, one of fashion. The best time for



persons who remain up all day is between breakfast and dinner; if, however, it be desirable for perspiration to be produced, the evening is more favourable, the patient retiring to bed without delay; persons should not expose themselves to cold, and, if delicate, they will do wisely to refrain from going into the open air for an hour or two after immersion.

The repetition of this remedy will depend on the physical ability of each individual to bear it; if it be not followed by languor, or excitement, it may be taken daily; but, as a general rule, every second or third day will be found sufficient.

In estimating the effects of baths on the system, their saline ingredients ought to be taken into consideration; however, on the continent, and by some writers in this country, a ridiculous importance has been given to the subject, the action of baths, whose only difference consisted in a few grains of almost inert salts, having been chronicled with the greatest minuteness. As a rule it may be stated that the larger the quantity of saline ingredients in a water, the more stimulating and tonic will it be; in acute and active diseases, therefore, the value of the bath will be in proportion to the purity of its water: in cutaneous diseases, also, a large quantity of saline matter is frequently found to irritate, or even small portions of irritating salts, such as chloride of sodium, &c., will be injurious.

The *Tepid* and *Temperate Baths* are frequently used at Askern, especially in chronic rheumatism, and cutaneous diseases: the lower temperature is employed with the view of dissipating as little as possible of the sulphuretted hydrogen gas; and, in those cases, where it is an object to apply this gas, rather than any particular degree of heat, this is a good practice.

The *Hot Bath* is a powerful stimulant: on entering water heated above 98 degrees, the heart's action is increased, the surface of the body becomes swollen, and a general excitement of the system takes place; these symptoms are soon followed by debility and torpor, and the skin breaks out into a copious perspiration; if the patient remain long in the water, giddiness ensues, and a state of insensibility is induced, which would soon destroy life: it is unnecessary to add that great caution should be exercised in prescribing so powerfully exciting a remedy as the hot bath. In those states in which the skin is very pale and bloodless, and the extremities cold, as in spasmodic cholera, and some intense inflammatory affections of the internal viscera, it will be found of service when used for a few minutes; in cases of sudden disappearance of measles, scarlet fever, &c., it frequently restores the eruption; in paralysis, where much external sensation has been lost, it has proved of very remarkable use; and in chronic rheumatism, attended with

rigidity of the joints, a like success has followed its application.

The *Vapour* Bath is an useful modification of, and in its general effects resembles, the warm and hot bath; it acts, however, much more decidedly on the skin, being almost invariably attended with copious perspiration: in many cases of chronic cutaneous disease, and of obstinate rheumatism and gout, this form of bath is very useful, but it requires to be employed with great care, and it is not suited to plethoric persons.

## SECTION IV.

ON THE MEDICINAL PROPERTIES OF THE ASKERN  
WATERS.

ALTHOUGH the analysis of the waters of Askern does not present any constituent whose acknowledged action on the system is of a very specific nature ; yet, in the present state of chemistry, it cannot be denied, that these springs may possess ingredients, hitherto undiscovered, which may exert considerable influence. The plausibility of this supposition is supported by the fact, of the great benefit which resulted in cases of *Goître*, and certain forms of *Scrofula*, from the drinking of mineral waters which, at one time, had no discovered ingredients that would account for their peculiar efficacy ; such waters were afterwards found to contain Iodine and Bromine, two powerful remedies in these diseases, and thus their effects were explained.

Dr. Daubeny remarks, in the excellent report before referred to, that “ to refuse credence to the reports given by medical men, with respect to the salutary or injurious influence of a particular water,

merely because the chemist can discover in it no active principle, would seem a proceeding not less unphilosophical than that of which our predecessors were guilty, in treating as fabulous the accounts given of stones, that had fallen from the sky, because they did not understand how such ponderous masses could have continued suspended in it."

"Chemists, in the pride of half-knowledge, may have smiled at the faith reposed in the water of Ashby-de-la-Zouch, in Leicestershire, and Kreutznach in the Palatinate, both of which until lately appeared to be little more than mere saturated solutions of common salt: but now that they are known to contain Iodine and Bromine, we see the secret of their then mysterious agency."

But, whilst admitting the possibility of the presence of hitherto undetected agents in the Askern waters, it is certain that their known constituents, on the action of which I will here subjoin a few remarks, exert a powerful influence on the system.

And first, with regard to the vehicle, *the water*, in which all the other ingredients are contained, an agent which plays so important a part in the economy of nature, and has so remarkable relations to the health, and even existence of man. That water alone may act as a powerful medicine, especially when it replaces the various stimulating beverages which persons are in the habit of taking, there can

be no question ; and, if in addition to this change; for a sedentary and indolent life, there be substituted one of active and regular exercise, great cures may be anticipated. It is in this way that Priessnitz, the peasant of the Gräfenberg, has succeeded in curing by cold water and exercise, many of those whose lazy and luxurious habits would have resisted the favourable action of the most potent medicines ; it is not, however, to be supposed that such a system will cure all diseases, and hydropathy, like homœopathy, and a thousand other forms of quackery, results from a desire to vaunt as of universal efficacy that which is only in certain cases beneficial. It is not because a remedy cures one disease or ten diseases that it is good for all, and it is only those whose minds are incapable of distinguishing one thing from another that can fall into such an error ; it is this false reasoning that constitutes the pretensions of the quack, and an inability to distinguish its absurdity that characterizes his dupes.

That cold pure water is a remedy of considerable influence is not a modern discovery, and many able physicians have warmly advocated its employment : the celebrity, indeed, of some of the spas of England, depends on their presenting an almost pure water ; such are the springs of Malvern in Worcestershire, Ilkley in Yorkshire, and many others on the continent. The effects of these waters have been minutely detailed by various authors ;

and there can be little doubt that both their internal and external use has been very beneficial in many diseases.

The mode in which water benefits health is undoubtedly through its influence on the secretions of the body ; and here I would make a remark, which may explain, in some measure, the salutary effects arising from mineral waters generally : we always find those remedies which promote the various secretions, most valuable in those states where it is clearly indicated by the present or past character of the secretions, that they have been primarily disordered. If we consider how small a change is required in chemical compounds, to render bodies eminently noxious that were before comparatively inert, we are prepared to ascribe powerful effects to those changes in the secretions which accompany severe forms of disease : in the kidneys, the liver, and the mucous membranes, we see disease following a departure from their healthy functions ; and this is probably the case with other organs, whose secretions we cannot so accurately investigate. From this we may conclude that whatever produces a decided effect on the secretory system, may be expected to relieve those diseases which are connected with, or dependent on, an alteration of the natural secretions.

Water, and fluids in general, have probably a more important influence on the secretions than is

usually supposed: when taken into the stomach, the liquid is absorbed, and then introduced into the blood, from whence it is got rid of by the various secreting surfaces, as the skin, kidneys, and mucous membranes of the lungs and intestines; in cases of disorder of these organs, such an action alone is often capable of restoring their healthy functions, and gives relief in many forms of indigestion, bilious derangement, &c. The drinking of large quantities should be accompanied with exercise; for, unless the circulation be active enough to throw off the water by the secreting vessels, it would thin the blood, and be deposited in structures from whence it might not be easily removed: persons with a languid circulation, and unequal to exercise, should always avoid taking much fluid.

The next agent of which I shall speak, and which is undoubtedly the most important one in the waters of Askern, is the *Sulphuretted Hydrogen* or hydrosulphuric acid; this gas is frequently met with in nature, as the product of the decomposition of organized bodies, and more seldom as the result of that of inorganic substances; the latter would appear to be the origin of that which is found in most mineral waters. It has a very powerful influence on animals, acting as a poison when they are exposed to it in large quantities, and this the more strongly in proportion to their elevation in the scale of organization; man seems the most susceptible



of its deleterious agency; I have pointed out the fact, that some of the lower animals not only live in water impregnated with it, with impunity, but that they do not exist without it. Although there can be no question as to the activity of this gas as a poison, yet it is not correct to suppose, as many writers on poisons have done, that the symptoms of persons exposed to the gases from drains, sewers, and other receptacles of decomposing animal and vegetable matter, are due only to sulphuretted hydrogen. We have not yet sufficiently advanced in the science of organic chemistry, to be able to say positively what is the exact nature of the gases that escape from decomposing organized matters; sulphuretted hydrogen is doubtless one of them, but we must not consider that all the effects of such gases are referable to it alone. Nor does this gas appear to be the source of fever as some have supposed: Harrogate and Askern, and many places on the continent where this gas is given off, in considerable quantities, from the water, are remarkably free from all kinds of fevers. The waters of Africa (see page 98) have been supposed to abound with it, and to produce the frightful destruction of European life which occurs in that country; in the late Niger expedition, every precaution was taken to divest the atmosphere of this gas, but without any preventive effect; the fever broke out, and thus confirmed the views of those

who believed its ravages to be entirely independent of the sulphuretted hydrogen.

This gas, like carburetted hydrogen and carbonic acid, acts as a narcotic, its immediate effects being felt on the nervous system : when persons are largely exposed to its influence, torpor and drowsiness are produced, which are followed by coma, convulsions, and death from asphyxia. Like all narcotics, when taken in small quantities, its action is stimulant, and it is in this way that it becomes valuable as a medicine. It has been recommended by medical writers in various diseases ; Galen counselled its use in Phthisis ; Dalmas and Andral also bear testimony to its utility ; and the late Dr. Armstrong believed it would, when properly used, form a powerful resource, in this fatal malady. With regard to tubercular consumption, it ought, however, to be remarked, that we have at present little certain evidence that it can be cured after it is once really established : the boasted cures have usually been instances of some chronic affection of the mucous membranes of the air passages, which no practised stethoscopist could mistake for phthisis ; in these cases, sulphuretted hydrogen might probably be of great service. Baudelocque speaks highly of it in chorea, and nervous maladies generally ; and most writers agree that, where there is any undue or deranged action of the mucous membranes, it is a valuable remedy, and may with advant-

age be administered, as in cases of bronchorrhea, dysentery, leucorrhœa, &c. In chronic rheumatism, and the different forms of cutaneous disease, it is recommended both as a bath, and as an internal medicine; as there is, however, some difficulty in its preparation, it is seldom used in this country, except when naturally presented, as in mineral waters; it is, of all agents that enter into their composition, probably the most active and important, and the one to which most attention should be given in the attempt to estimate their effect on the human body.

The *Carbonic Acid* and *Nitrogen* in the waters of Askern are not in sufficient quantity to require any lengthened notice; they probably assist the action of the sulphuretted hydrogen; and, if this last should prove oppressive to the stomach, it will be relieved by that water which contains most carbonic acid; for this purpose, the Terrace bath well is the best at Askern.

The saline matters are in too small a quantity to exert any powerful or peculiar effect on the system; it is, however, very well known, that they act the more efficiently in proportion to their greater dilution. These waters frequently act as a purgative, but more generally as a diuretic; however, should it in particular cases, be desirable to increase the former effect, any of the neutral salts may be added, as the sulphate of magnesia, tartrate of soda, &c.

The sulphate of lime is, in some of the wells, in large quantity, and though not known to possess very active properties, it adds to their tonic effect; the difference in the proportion of this substance is felt in bathing, and those waters with the most sulphate of lime are, *cæteris paribus*, the most stimulating.

Although a larger quantity of salts of various kinds than these waters contain, might, to some persons, be of advantage, yet, there can be little doubt that, in most cutaneous diseases, the more active forms of chronic rheumatism, and many cases of dyspepsia, the water, as a bath, is much more adapted to be useful without these adjuncts. Sir Arthur Clarke observes, that he has found “the warm *salt-water bath injurious*, in almost every species of cutaneous disorder, in consequence of the irritation produced by the particles of salt deposited on the skin;” and, the advantage of the absence of salts is proved by the fact that persons who have derived no benefit in these diseases, from bathing in the waters of Harrogate, where there are large quantities of salts, have been cured by those of Askern.

The effects and the mode of drinking the waters of Askern are thus described by Mr. Brewerton:—“Soon after drinking a glass of Askern water, the gas rises in the throat, and sometimes the water; a sense of weight is felt by some at the stomach,

and occasionally slight nausea, or tendency to sickness; sometimes there is dizziness, and a sensation of fullness in the head. Half a pint of the water, drunk two or three times a day, is a medium dose. It is generally drunk cold, but some prefer it warm, and indeed with delicate habits, and those who from drinking it experience a sense of weight at the stomach, it is found to agree better when taken warm, particularly at the commencement of the course. While continuing the use of the water, the sensible effects above mentioned either cease, or become less perceptible. During the drinking of the water, the urine becomes increased in quantity, and in some cases the bowels are relaxed, but, in general, this latter effect is not produced. Drinking the water alone, without bathing, appears to have proved most beneficial in complaints arising from indigestion, or connected with a deranged action of the stomach."

## SECTION V.

ON THE DISEASES IN WHICH THE ASKERN WATER  
IS RECOMMENDED.

WITH regard to sulphureous waters generally, Dr. Gairdner, in the admirable essay before alluded to, remarks,—“ The general effects of these waters are *stimulant*; and in this respect they are decidedly the reverse of the chalybeates, their effect being much more transient. Their action is chiefly exerted upon the liver and the system of the vena portæ, also upon the mucous coats and the cutaneous tissues. Sulphureous waters are extremely serviceable in gout and rheumatism, when these have degenerated into the chronic form, and in the stiffness and rigidities of the joints and ligaments, which continue long after the cessation of inflammatory action; in sprains and bruises, as well recent, as upon the numerous train of troublesome symptoms which they leave behind them; in chlorosis and those multifarious derangements of the uterine system, with which the female constitution so extensively sympathizes, this class of waters

has acquired great and merited reputation ; and also in syphilitic disorders which have passed into the secondary stage, and become rooted in the constitution. But it is on the tegumentary system that their most special effects are apparent, to which sulphur, naturally a specific for many of its diseases, is thus presented in its most penetrating and active form, aided by the detergent power of the water itself. Accordingly in *Leprosy*, *Herpes*, *Scabies*, *Elephantiasis*, &c., this has long been a remedy of the very first importance where it can be procured ; not merely as preparatory to the use of other substances, by restoring pliancy and perspirability to the skin, and putting a stop to that continual desquamation of the cuticle, which is frequently one of the most obstinate symptoms with which the physician has to contend ; but is itself also the sole agent under which all the formidable symptoms successively disappear.”

In endeavouring to form an estimate of the value of the waters of Askern, independent of a general belief of their utility in many diseases, I have availed myself of the reports of the cases which have been treated at the Bath Charity, and which have been recorded successively, during a period of nine years, by Mr. Richardson, Mr. Keyworth, and Dr. Oxley, all medical gentlemen resident at Askern : from these documents I have drawn up the following table.

## Patients treated from 1832 to 1836 :—

Diseases.	Cured.	Relieved.	Not benefited.	Total.
Rheumatism . . . . .	305	78	25	408
Cutaneous Diseases ..	60	11	3	74
Indigestion . . . . .	16	2	4	22
Paralysis . . . . .	8	0	3	11
Scrofula . . . . .	7	0	2	9

In the reports from 1838 to 1840, no distinction is made between the cured and relieved :

Diseases.	Cured or relieved.	Not benefited.	Total.
Rheumatism . . . . .	240	20	260
Cutaneous Diseases . . . . .	56	8	64
Indigestion . . . . .	24	4	28
Paralysis . . . . .	8	5	13
Scrofula . . . . .	7	5	12

The total number of cases treated at the Bath Charity, from 1832 to 1840 inclusive, was 1094, of which, 193 were diseases of various kinds which are not mentioned in the above tables.

In making a few remarks on the treatment of those affections which have been most benefited by the waters of Askern, I shall give the experience of the medical men in the neighbourhood, rather than my own, and especially that of Mr Brewerton, who for so many years, carefully studied their effects ; I shall not, however, enter into any lengthened description of diseases, but merely indicate those that appear to have been, or are likely to be, relieved by the bathing in, or the drinking of, these waters.



*Rheumatism.*—Of the various maladies which have been benefited, Rheumatism seems to stand first: it is in its chronic stages that persons should visit Askern; in cases of old standing, where there is rigidity of the joints, attended with swelling, a course of baths, of a heat varying from 95 deg. to 105 deg. will frequently effect a cure; when pain alone is left, after an attack of acute rheumatism, a lower temperature may be employed, commencing at 82 degrees; and gradually falling to that of the tepid, or even cold bath, if no increase of pain follow.

*Gout.*—To those suffering from the sequelæ of this disease, and who are disposed to submit to the necessary regimen, the baths of Askern promise much relief; it too frequently happens, however, that gout is met with in persons whose habits of indulgence in the luxuries of the table are so inveterate, that they do anything but aid nature, and the appropriate remedies, in its prevention and cure.

*Cutaneous Diseases* are amongst those most successfully treated at Askern, and many obstinate forms, which will not yield to ordinary methods of cure, obtain speedy relief from a course of sulphureous waters. The artificial sulphuretted hydrogen bath has been found, particularly in France, a most effective remedy. In some cases, the waters of Askern offer a great advantage over those, as at Harrogate, which contain a large quantity of saline

matter, and which are apt, consequently, to excite considerable irritation. I shall not here enter into any description of the various forms of cutaneous disease ; many of them are so transitory that persons will hardly resort to a watering place for their removal ; the most obstinate of them are, Lepra, Psoriasis, Impetigo, Eczema, Scabies, Lichen, Prurigo, and Acne : these diseases will often be cured by the warm or vapour-bath, combined with the internal use of the sulphureous water. I would here make a remark, which cannot be too generally borne in mind, that a disordered state of the digestive system is frequently the source of these complaints, and that unless attention be paid to the diet, persons may in vain anticipate relief from bathing in, or from drinking, mineral waters.

*Indigestion.*—This is one of the most common forms of disease in the overworked and overfed communities of Great Britain ; on the one hand there are those who keep the powers, either of mind or body, or of both of them, so constantly on the stretch, that they absorb, as it were, the stimulus which is necessary to enable the stomach to digest its food, and they become the victims of indigestion ; on the other hand there are those, whose circumstances in life enable them to indulge in the pleasures of the table, and to gratify the sense of taste at the expense of the stomach, and who consequently pay a severe penalty for overtasking this organ. In the various

forms of this protean disease, and source of disease, it is not to be supposed that the simple administration of a sulphur water will cure; but, as the skin, and the kidneys, and other secretory organs, sympathize with the stomach in its various derangements, the bathing in, and drinking the waters of Askern, will often be attended with the best effects. The absence of the causes of indigestion will have singly a decided influence, and a medical practitioner will perhaps oftener display his skill in sending his patients to a watering place, than in ordering them powerful medicines.

In that form of the disease in which phthisis frequently originates, and which has been called by Dr. Todd, strumous dyspepsia, the use of the Askern water would probably be of more use than many others as there is always a morbid condition of the mucous membranes, which, although it may be attended with constipation, would be increased by waters containing a large amount of aperient salts. These cases most commonly occur in the midst of densely populated towns, where pure air and warm bathing, both important elements in the treatment, are rarely obtained, and lightly valued.

*Paralysis or Palsy.*—This affection, varying in degree, from the derangement of the sensation or motion of a part, to the loss of the entire sensation and motion of the lower or lateral half of the body, frequently resists the best directed treatment. Its

causes are various, and according to these will be the probability of its cure ; when it depends on the introduction of metallie poisons, or on functional derangement of any part of the nervous system, relief may be anticipated. In obstinate cases, the hot-bath has been strongly recommended, and it has been observed that persons in this, can bear a much higher temperature, and that for a longer time, than in any other diseased state ; care must, however, be taken that there is no tendency to apoplexy, under which circumstances the hot-bath would be likely to destroy life.

*Scrofula.*—There are two widely different constitutions in which this disease manifests itself ; in the one there is a rapid pulse, and all the functions betray excitement ; in the other it is slow and languid, and the whole system exhibits a want of action ; in cases indicating the sluggish habit of body, the stimulant influence of sulphureous waters has been found very beneficial.

There are many forms of chronic disease, and nervous derangement, for which, on the principles before laid down, we may expect relief from the judicious use of sulphureous waters ; if it be borne in mind, that their action is generally stimulant, and that by their external and internal application, the functions of the skin, of the mucous membranes of the stomach and intestines, and also of the kidneys, may be promoted, the judicious practitioner of

medicine will not be at a loss as to the kind of cases likely to be benefited by a residence at Askern. Most writers on sulphureous waters have recommended them, in chlorosis, leucorrhœa, bronchorrhœa, chronic dysentery, secondary syphilis, &c.: the diseases in which they are contra-indicated are those in which there is a tendency to inflammatory action, febrile excitement, or over-excitement of the nervous system.

## SECTION VI.

RULES TO BE OBSERVED DURING THE USE OF THE  
ASKERN WATERS.

MODERATION should be strictly practised both in eating and drinking ; plain animal and vegetable food may be taken in most cases ; spirits, wine, and ale should be generally avoided by persons visiting Askern for health ; at the same time, there are many whose nervous system requires some stimulant, especially if long accustomed to its use. Early rising and retiring to rest, are advisable, and eight, nine, or ten hours repose in bed should be secured by the invalid ; crowded rooms are prejudicial, both on account of the excitement, and the impure air which is necessarily inhaled in large assemblies.

The muscular system should be daily exercised, and always, when the weather permits, out of doors ; the blood in the lungs is thus brought in contact with the oxygen of the atmosphere, and an invigoration of the whole frame is the result, which cannot be procured in any other manner ; walking is the best and most natural exercise. The practice of reading

during a walk is detrimental ; the attention will be more healthily occupied by the interesting and ever-varying objects of the external world.

The water should be drunk before breakfast, one, two, or three glasses, according as the stomach will bear it ; the dose may be repeated between breakfast and dinner, the latter of which meals should, by all valetudinarians, be taken early, I mean thereby, about six hours after rising ; the evening is a favourable time for a third dose ; it has been employed as a beverage at meals, but this I should not advise, for it is not probable that the nauseous draught can then be productive of advantage. It is best taken cold, where it thus agrees with the stomach, but when this is not the case, the water from the springs should have heated water added to it, until a suitable temperature is obtained. Some persons dissolve in it the Epsom salts, an unnecessary addition in the large majority of cases ; where such a remedy is required, I should recommend, in preference, a dose of some aperient medicine, as rhubarb and magnesia, to this adulteration of the natural spring.

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